The PHOTOFACT Servicer

SET 425 ★ *Published for all users of Howard W. Sams' Photofact Folders* ★ DEC. 15, 1958

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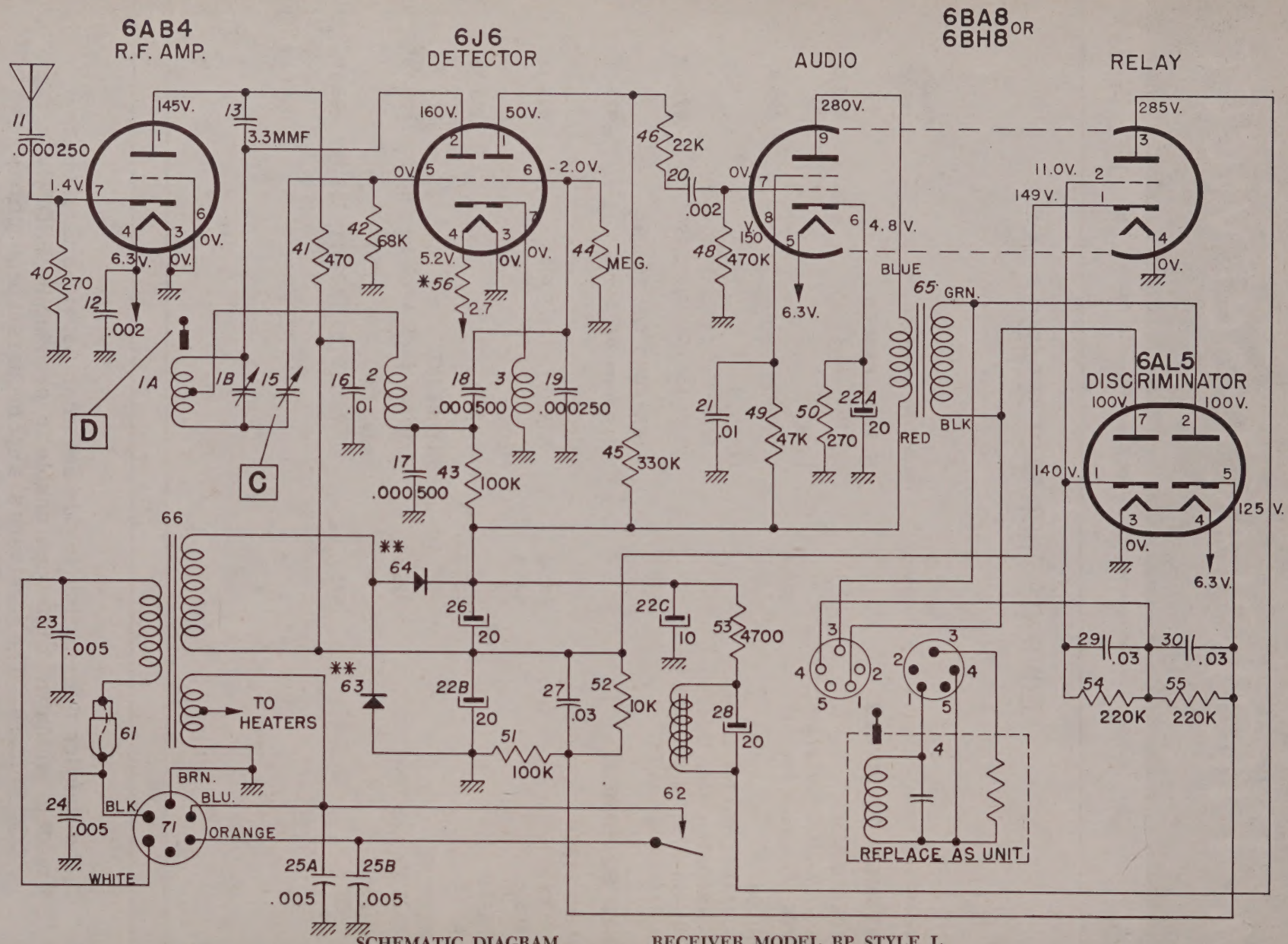
The service information in this Servicer provides data on models which we have been unable to present in PHOTOFACT Folders. The receivers are not in current production; a requirement for PHOTOFACT coverage, and we are therefore presenting schematics and supplementary data that will be of assistance when servicing these models.

DELCO GARAGE DOOR OPENER CONTROL

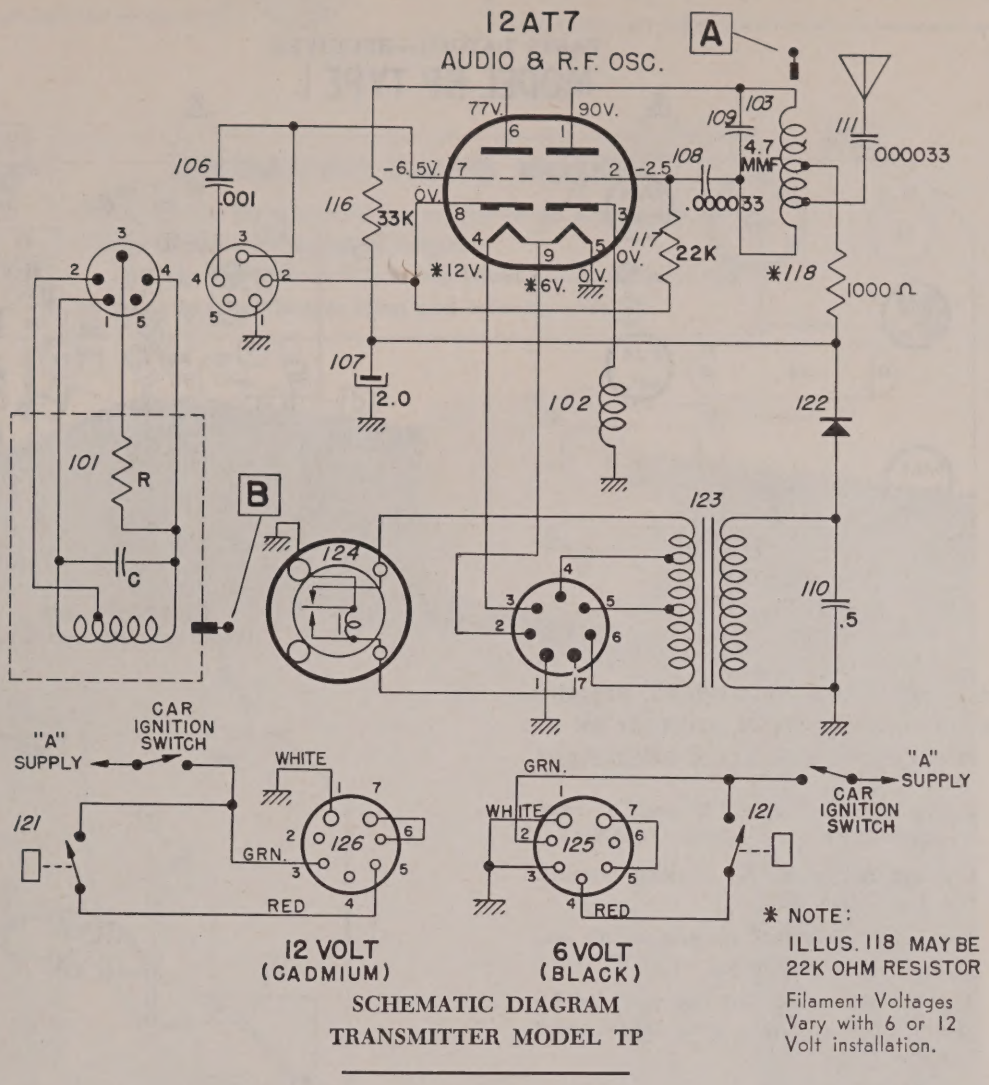


SCHEMATIC DIAGRAM RECEIVER MODEL RP STYLE L

* Not included in early models.

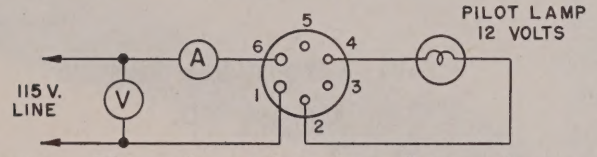
** Replace all selinium rectifiers with silicon rectifiers

SCHEMATIC DIAGRAMS COURTESY DELCO RADIO DIV. GENERAL MOTORS CORP.



SCHEMATIC DIAGRAM
TRANSMITTER MODEL TP

Receiver Adapter Cable (Service Aid)



Adapter cord for receiver testing. The male octal is plugged into adapter and lamp on will show the pull in of sensitive relay. The relay can also be heard as it pulls in.

TRANSMITTER ALIGNMENT

VTVM connections ..... Receiver audio coil screw to chassis.

STEP	TRANSMITTER	RECEIVER	VTVM READING	ADJUSTMENT
1	Off	On	Small Reflec. .25 To 3VAC	None
2	On	On	Maximum	A (RF Coil)
3	On	On	Maximum	B (Audio Coil)

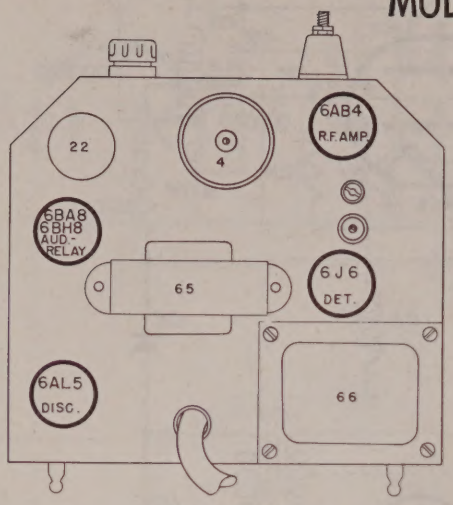
RECEIVER ALIGNMENT

STEP	CHECK	VTVM	READING	ADJUSTMENT
1	Quench	Center Tap of Illus. 1A	Approx. 135V DC	C (Illus 15)
2	*R. F. Sensitivity	Pin #2 6J6 to Ground	Maximum	D (RF Coil)

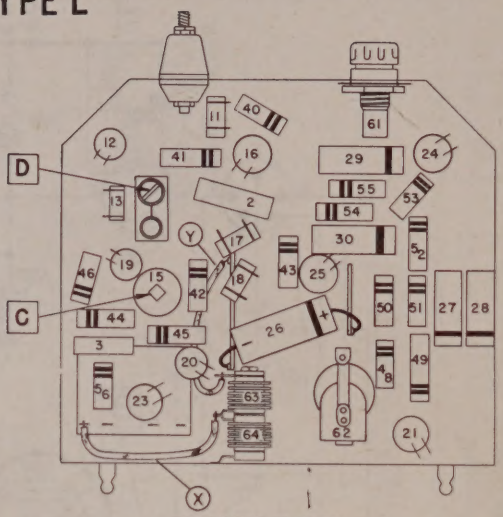
*Either transmitter is keyed, or modulated R. F. Generator is applied. If R. F. Generator is used, it may be necessary to retune the transmitter to receiver.

PARTS LAYOUT—RECEIVER

MODEL RP TYPE L



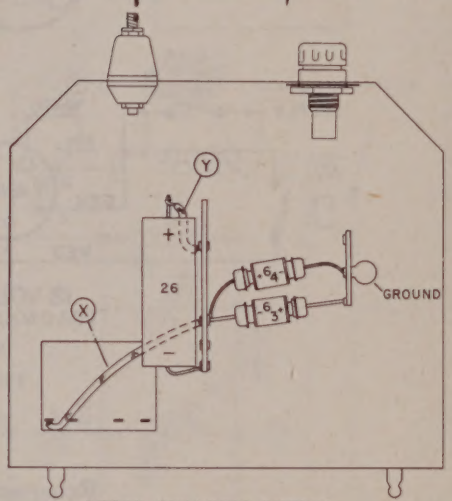
TUBE VIEW



CHASSIS VIEW
(With selenium rectifiers)

ALL SELENIUM RECTIFIERS, REGARDLESS OF CONDITION, SHOULD BE REPLACED WITH SILICON RECTIFIERS

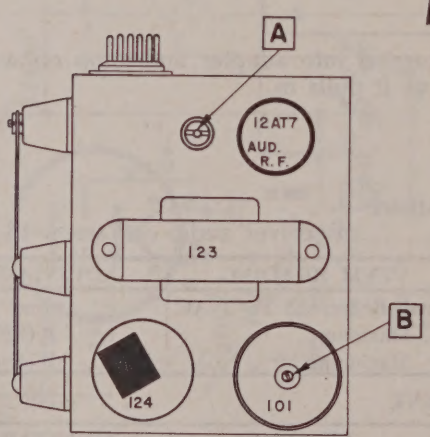
1. Disconnect 2 red wires "X" and "Y" from rectifiers and remove selenium rectifiers.
2. Connect red wire "X" to long terminal board as shown.
3. Reposition capacitor, Illustration 26, and connect "plus" end to red wire "Y".
4. Install 2 silicon rectifiers (see parts list for part number) as shown, being careful about polarity.



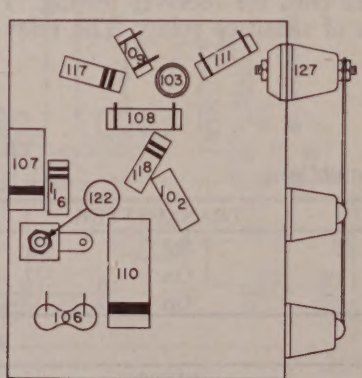
NEW CHASSIS VIEW
(With silicon rectifiers)

PARTS LAYOUT—TRANSMITTER

MODEL TP



TUBE VIEW



CHASSIS VIEW

DELCO GARAGE DOOR OPENER CONTROL

PHOTOFACT* Folder

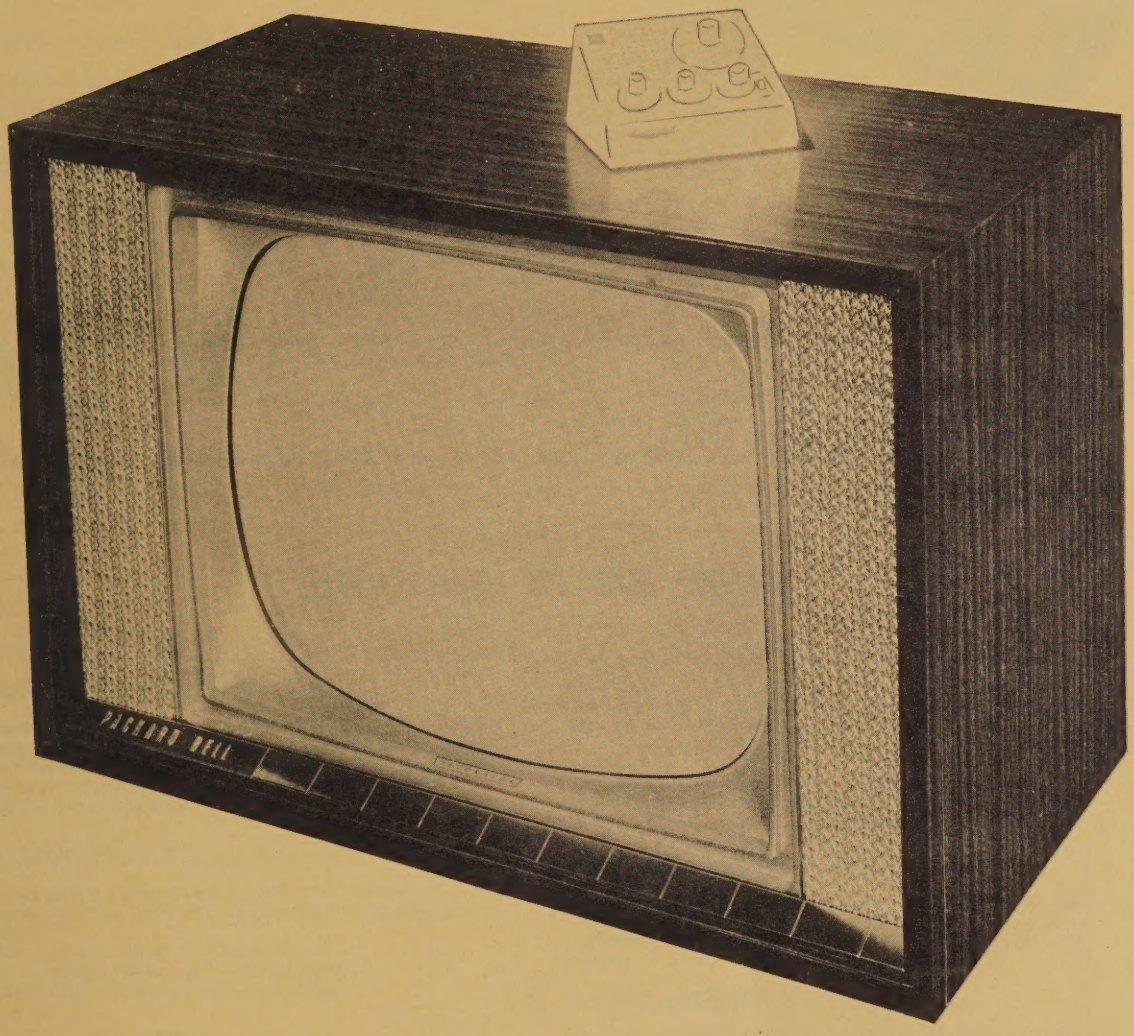
PACKARD-BELL MODELS 21DC9, 21DC10, 21DT4, 24DC5 (Ch. 98D4, 98D5, RM-201)

IMPORTANT FILING NOTICE

The TV Folder for this envelope will be found among the first folders in this complete Set of folders.

Merely insert the corresponding folder on this model in this envelope to retain proper filing and indexing order.

PACKARD-BELL MODELS 21DC9, 21DC10, 21DT4, 24DC5 (Ch. 98D4, 98D5, RM-201)



MODEL 21DC9 (CH. 98D4 & RM-201)

PACKARD-BELL MODELS 21DC9, 21DC10, 21DT4, 24DC5 (Ch. 98D4, 98D5, RM-201)

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PHOTOFACT* Folder

EIA MEMBER ELECTRONIC INDUSTRIES ASSOCIATION

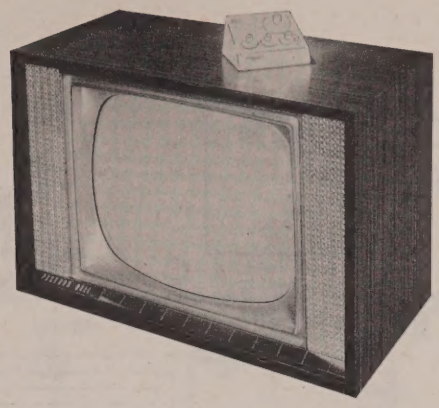
PACKARD-BELL MODELS 21DC9, 21DC10, 21DT4, 24DC5 (Ch. 98D4, 98D5, RM-201)

PACKARD-BELL MODELS 21DC9, 21DC10, 21DT4, 24DC5 (Ch. 98D4, 98D5, RM-201)

DISASSEMBLY INSTRUCTIONS

CHASSIS REMOVAL

1. Remove 8 wood screws holding rear cover. Remove rear cover.
2. Remove speaker plug and 2 remote control plugs.
3. Remove 2 wood screws holding phono input panel to the cabinet.
4. Remove 1 metal screw holding top sliding chassis support rail.
5. Remove 4 bottom chassis bolts.
6. Remove chassis.



MODEL 21DC9 (CH. 98D4 & RM-201)

TRADE NAME	Packard-Bell	MODELS	CHASSIS
		21DC9, 21DC10, 24DC5	98D4
		21DC9, 21DC10, 24DC5 ..... (Remote Control)	RM-201
		21DT4	98D5
MANUFACTURER	Packard-Bell Co., - Service Div., 11th & Hope Streets, Los Angeles 15, Calif.		
TYPE SET	Television Receiver with Remote Control		
TUBES	Twenty-one		
POWER SUPPLY	110-120 Volts AC, 60 Cycle	RATING	250 Watts, 2.32 Amp. @ 117 Volts AC
		Tuning	290 Watts, 2.7 Amp. @ 117 Volts AC
		Off	4 Watts, .040 Amp. @ 117 Volts AC (Ch. 98D4)
TUNING RANGE	Channels 2 thru 13 VHF, 14 thru 83 UHF, Video IF 45.75MC, Sound IF 41.25MC (Intercarrier)		

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

Touch-up adjustment of the VHF Oscillator is possible from the back without removing the rear cover. Set the Fine Tuning to the center of its range. The adjustments are accessible one at a time as channels are switched. Adjust for best picture and sound.

PICTURE TUBE SAFETY GLASS CLEANING

Press bottom center of safety glass back firmly.
Insert business card between glass and metal trim (left of center.)
Slide card to right to depress spring.
Lift metal trim at bottom edge straight up.
Remove glass by pulling bottom edge tabs.

SPECIAL ADJUSTMENTS

A. AGC
Observe the picture and advance the AGC control to a point where the picture distorts or a buzz is heard in the sound. Back off from this setting until the picture becomes stable with no noise in the sound.

B. ANI
Adjust picture to lock in with hold controls. If picture jitters, tears, etc. adjust ANI until stable. Readjust the hold controls and check operation on all channels in the area.

C. Focus
The focus may be varied by means of a Focus control. (For location, see tube placement chart.)

D. Width
The width may be varied by means of a 6800Ω 7W resistor (R100) connected across terminals 1 and 2 of the Horizontal Output transformer. Remove the resistor for greater width.

HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

The Horizontal Frequency coil is used as the Horizontal Hold control. Adjust the Horizontal Hold until the picture synchronizes horizontally. (For location, see tube placement chart.)

SOUND IF DETECTOR BUZZ ADJUSTMENT

To eliminate intercarrier buzz, adjust the Ratio Detector secondary (A14) located on the bottom of chassis.

FUSE

A fuse is used for LV power supply protection, and a fuse wire for filament protection.

CENTERING

Centering is accomplished mechanically by adjusting two magnetic rings around the neck of the picture tube. Rotate the two rings around the neck of the tube until the picture is properly centered.

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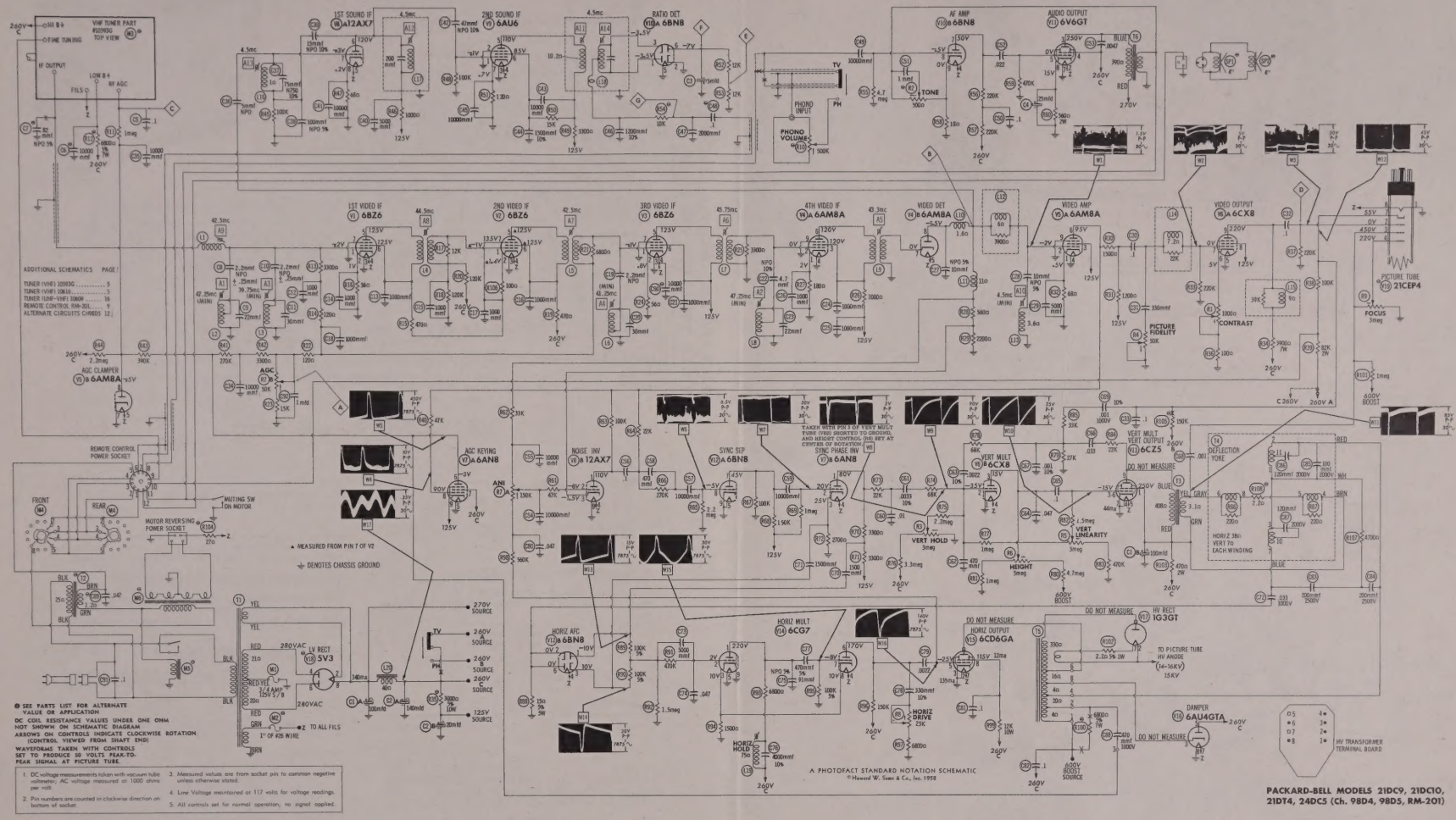
SET 425 FOLDER 1



PACKARD-BELL MODELS 21DC9, 21DC10, 21DT4, 24DC5 (Ch. 98D4, 98D5, RM-201)

◉ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

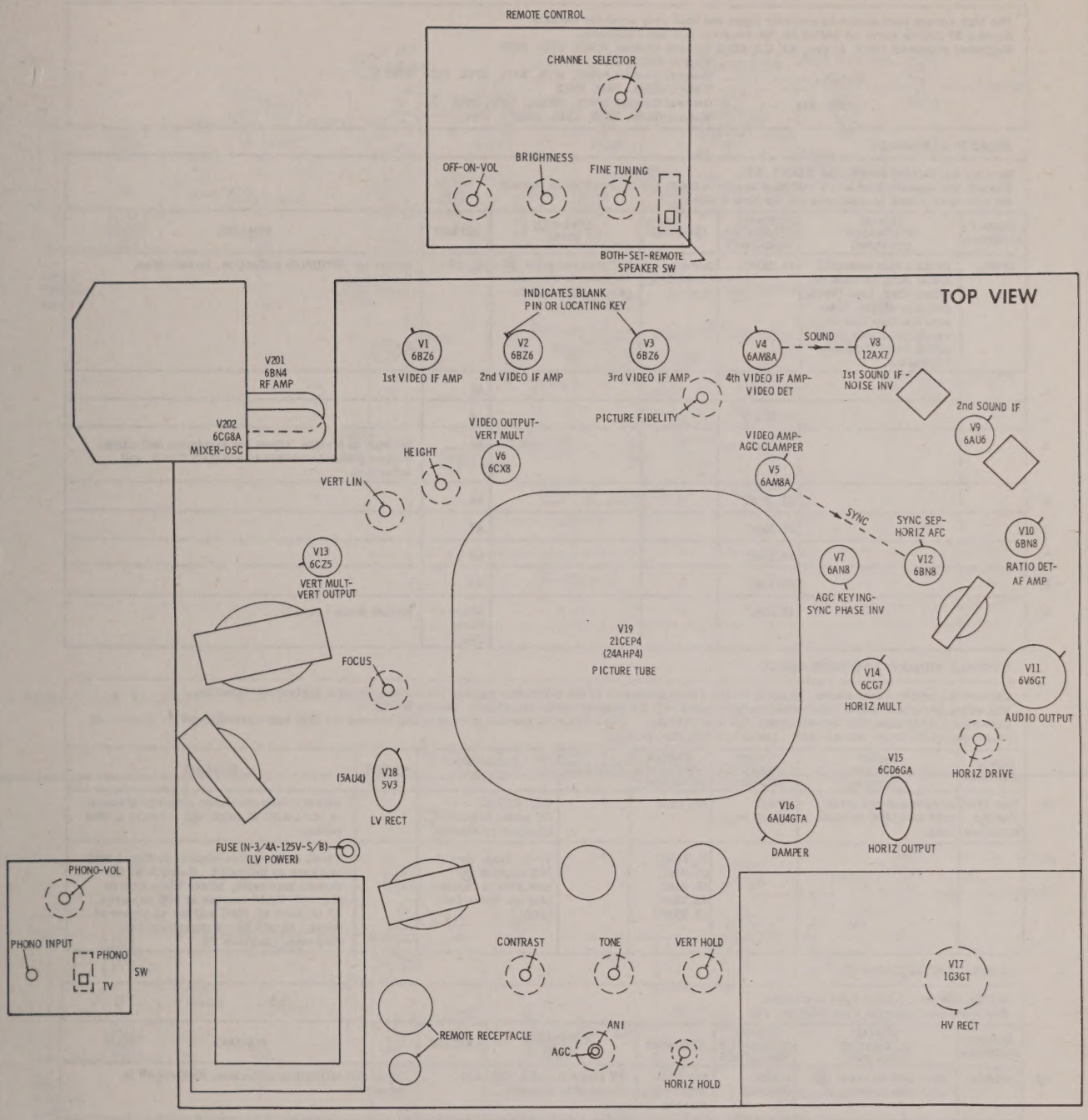
DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM.

ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (CONTROL VIEWED FROM SHAFT END)

WAVEFORMS TAKEN WITH CONTROLS SET TO PRODUCE 50 VOLTS PEAK-TO-PEAK SIGNAL AT PICTURE TUBE.

1. DC voltage measurements taken with vacuum tube voltmeter. AC voltage measured at 1000 ohms per volt.
2. Pin numbers are counted in clockwise direction on bottom of socket.
3. Measured values are from socket pin to common negative unless otherwise stated.
4. Line Voltage maintained at 117 volts for voltage readings.
5. All controls set for normal operation, no signal applied.

TUBE PLACEMENT CHART



TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce indicated symptoms. Refer to tube placement chart for location and type of tube.

POWER SUPPLY FAILURE
No raster, no sound Fuse (3/4A), Fuse Wire (F11), V18

SWEEP FAILURE
No raster, has sound V12, V14, V15, V16, V17, V19
No vertical deflection V6, V13
Poor vert. linearity or foldover V6, V13
Poor horiz. linearity or foldover V14, V15, V16
Narrow picture V41, V15, V16, V18
Vert. off freq. V6, V13
Horiz. off freq. V14

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster V1, V2, V3, V4
No pic, no sound, has snow V201, V202, V1
No pic, has sound, has raster V5, V6, V19
Has pic, no sound V8, V9, V10, V11
Overloaded picture V7

SYNC FAILURE
No vert. sync V12, V7
No horiz. sync V12, V7
No vert. or horiz. sync V12, V7

ALIGNMENT INSTRUCTIONS

PRE-ALIGNMENT INSTRUCTIONS

The high voltage lead should be securely taped and kept away from the chassis.
Allow a 20 minute warm-up period for the receiver and test equipment.
Suggested alignment tools: Al thru A9, A12, A13 . General Cement #5003, 8721, 8722
Walsco #2512, 2519
A10..... General Cement #5009, 8195, 8274, 8275, 8728, 8987
Walsco #2515, 2531, 2532
All, Al4 ..... General Cement #8606, 8606L, 8282, 9295
Walsco #2526, 2543, 2544, 2545

VIDEO IF ALIGNMENT

Remove the Noise Inverter tube (12AX7, V8).
Connect the negative lead of a 6 volt bias supply to point (A) . Positive to chassis.
Set generator output at maximum for the first 3 steps.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
1.	Direct	Place a thin insulated metal strip between the Mixer-Osc. tube (V202), and tube shield. Connect the high side of sweep generator to the metal strip. Low side to chassis.	47.25MC	Any non-interfering channel	DC probe to point (B) . Common to chassis. (Across Video Det. load)	Al, A2	Adjust for MINIMUM deflection. Reduce bias, if necessary.
2.	"	"	39.75MC	"	"	A3	"
3.	"	"	41.25MC	" "	"	A4	"
4.	"	"	43.3MC	"	"	A5	Set bias at 6 volts. Adjust for maximum deflection. Reduce generator output to maintain 2 to 3 volt deflection.
5.	"	"	45.75MC	"	"	A6	"
6.	"	"	42.5MC	"	"	A7	"
7.	"	"	44.5MC	"	"	A8	"
8.	"	"	42.5MC	"	"	A9	"
9.	"	"	45.0MC	"	"	Mixer Plate Coil	Repeat steps 1 thru 9.

OVERALL VIDEO IF RESPONSE CHECK

Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Connect a 1.0mfd capacitor between point (C) and chassis. Use a separate marker generator and connect the high side to the ground connection of the tuner output cable. Leave low side disconnected.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
10.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	63MC (10MC Swp)	Not used	3	USE VTVM. DC probe to point (C). Common to chassis.		Adjust sweep generator output to produce -4 volts AGC at point (C) . Leave at this setting.
11.	"	"	"	41.25MC 43.0MC 45.0MC 45.75MC 47.25MC	"	Vert. Amp. thru 22K to point (B) . Low side to chassis. (Across Video Det. load)		Check for response similar to Fig. 1 with markers as indicated. Retouch A9 for overall bandwidth, Mixer Plate Coil to place 45.75MC marker at 50% on curve, A7 to place 43.0MC marker at corner of curve, A5 and A8 for maximum flat response. Replace V8.

4.5MC TRAP ALIGNMENT

Set the Contrast control fully clockwise.
Remove Video Detector tube (6AM8A, V4).

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
12.	.001mfd	High side to point (B) . Low side to chassis.	4.5MC (Unmod)	Any non-interfering channel	RF probe to point (D). Common to chassis.	A10	Adjust for MINIMUM deflection. Replace V9 in the socket.

If signal generator of crystal accuracy of at least one volt output is not available, A10 must be adjusted using TV station signal.
Detune Fine Tuning to accentuate 4.5MC beat pattern in picture. Adjust A10 for MINIMUM beat in the picture.

SOUND IF ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
13.	.001mfd	High side to point (B) . Low side to chassis.	4.5MC (Unmod)	Any non-interfering channel	DC probe to point (F) . Common to chassis.	All, A12, A13	Adjust for maximum deflection.
14.	"	"	"	"	DC probe to point (G) . Common to point (E) .	A14	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting. Repeat steps 13 and 14.

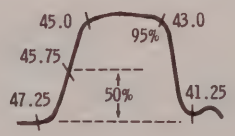
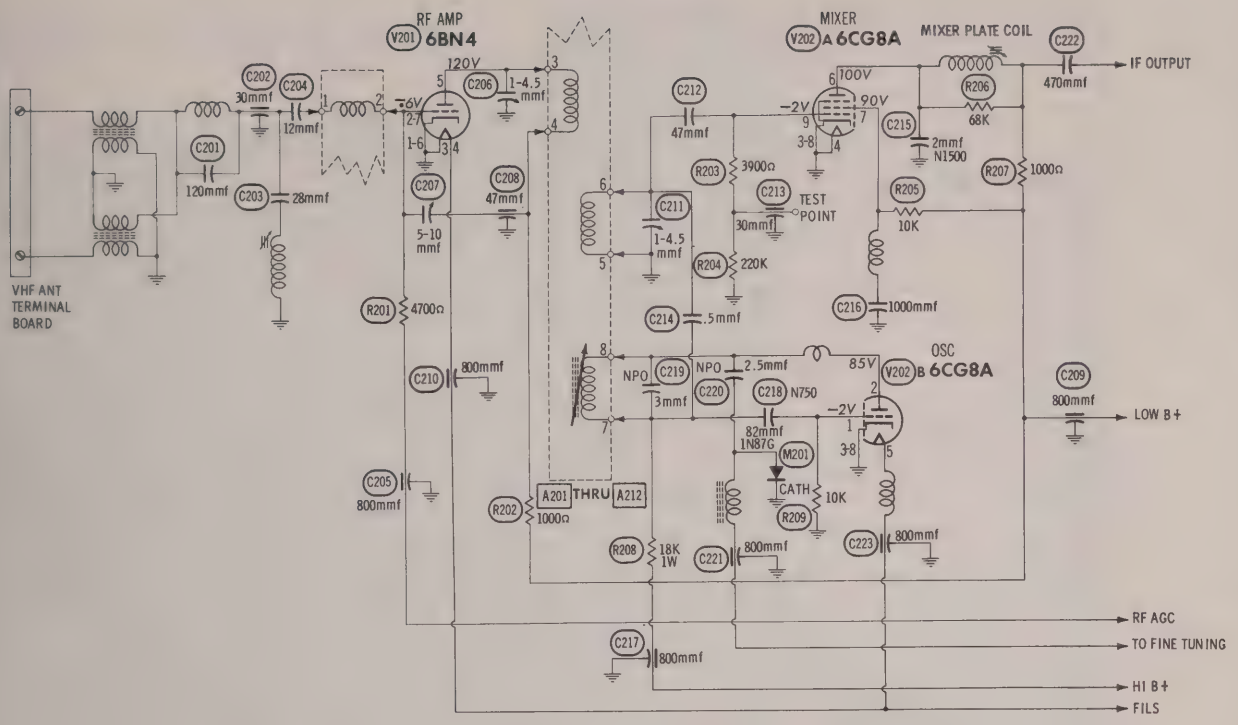


FIG. 1

TUNER ALIGNMENT INSTRUCTIONS LOCATED ON PAGE 6



A PHOTOFACT STANDARD NOTATION SCHEMATIC

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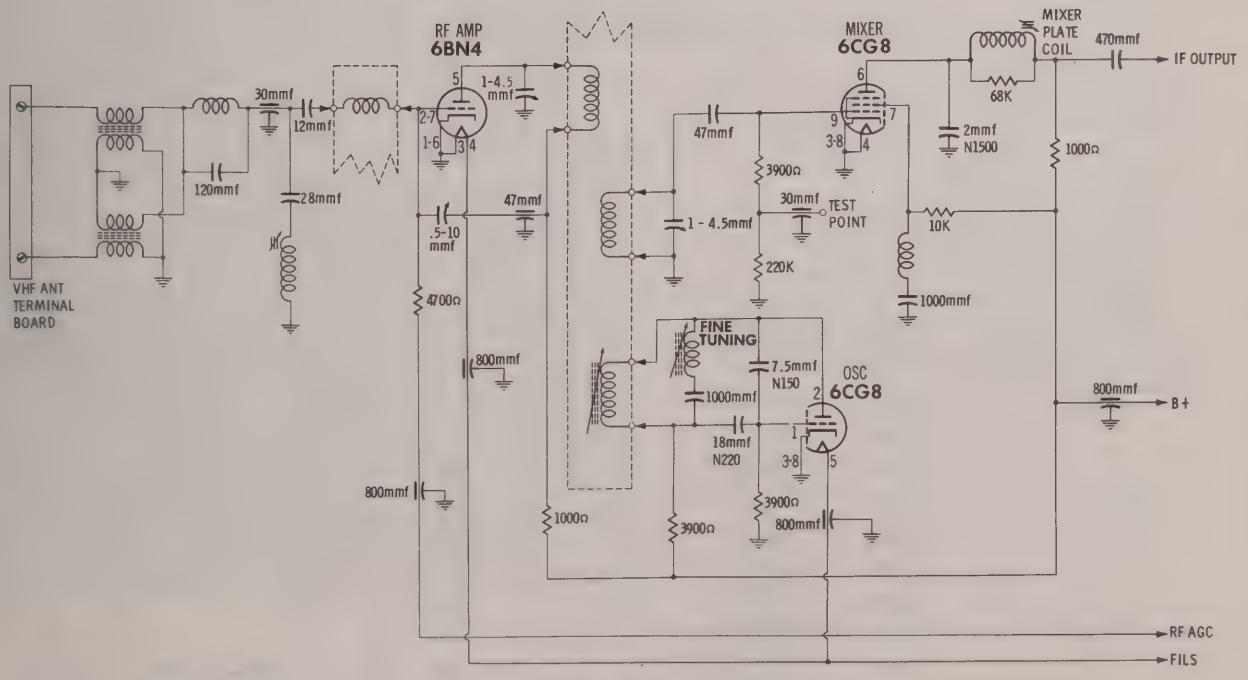
VHF TUNER 10593G



A PHOTOFACT STANDARD NOTATION SCHEMATIC

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VHF TUNER 10616A

TUNER 10593G PARTS LIST AND DESCRIPTIONS

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE	NOTES
V201	RF Amp.	6BN4	

ITEM No.	USE	TYPE	NOTES
V202	Mixer-Osc.	6CG8A	

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP.	VOLT	Packard-Bell PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	SPRAGUE PART No.	
C201	120			BPD-00012	DD-121	L10T12	UC-5312	5GA-T12	
C202	30								
C203	28								
C204	12								
C205	800			EF-001	MFT-1000			503C-D1	
C206	1-4.5								
C207	5-10								
C208	47								
C209	800			EF-001	MFT-1000			503C-D1	
C210	800			EF-001	MFT-1000			503C-D1	
C211	1-4.5								
C212	47								
C213	30								
C214	.5								
C215	2								N1500
C216	1000			BPD-001	DD-102	BYA6D1	DC521	5HK-D1	
C217	800			EF-001	MFT-1000			503C-D1	
C218	82								N750
C219	3			NPO-DI 3.0		C10V3C			NPO
C220	2.5								NPO
C221	800			EF-001	MFT-1000			503C-D1	
C222	470			BPD-00047	DD-471	BYA10T47	UC-5347	5GA-T47	
C223	800			EF-001	MFT-1000			503C-D1	

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING		Packard-Bell PART No.	NOTES
	OHMS	WATT		
R201	4700Ω			
R202	1000Ω			
R203	3900Ω			
R204	220K			
R205	10K			

ITEM No.	RATING		Packard-Bell PART No.	NOTES
	OHMS	WATT		
R206	68K			
R207	1000Ω			
R208	18K	1		
R209	10K			

CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA			NOTES
		Packard-Bell PART No.	CBS PART No.	SYLVANIA PART No.	
M201	1N87G		1N60	1N60	Fine Tuning Diode (Pigtail)

TUNER ALIGNMENT INSTRUCTIONS

PRE-ALIGNMENT INSTRUCTIONS

The high voltage lead should be securely taped and kept away from the chassis.
Allow a 20 minute warm-up period for the receiver and test equipment.
Suggested alignment tools: General Cement #8607, 9087, 9294
Walsco #2523, 2528, 2534, 2535, 2538

VHF OSCILLATOR ALIGNMENT

Connect variable bias to IF AGC line. Adjust bias to obtain response curve which shows no indication of overloading.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Set the Fine Tuning to the center of its range.
Use only enough sweep generator output to provide a usable pattern on scope.
Use 10MC sweep unless otherwise noted.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	213MC	211.25MC 215.75MC	13	Vert. Amp. thru 47K across Video Detector load.	A201	Adjust to place sound marker in trap notch as in Fig. 201. Video marker should fall at 50%.
			207MC	205.25MC 209.75MC	12		A202	
			201MC	199.25MC 203.75MC	11		A203	
			195MC	193.25MC 197.75MC	10		A204	
			189MC	187.25MC 191.75MC	9		A205	
			183MC	181.25MC 185.75MC	8		A206	
			177MC	175.25MC 179.75MC	7		A207	
			85MC	83.25MC 87.75MC	6		A208	
			79MC	77.25MC 81.75MC	5		A209	
			69MC	67.25MC 71.75MC	4		A210	
			63MC	61.25MC 65.75MC	3		A211	
			57MC	55.25MC 59.75MC	2		A212	

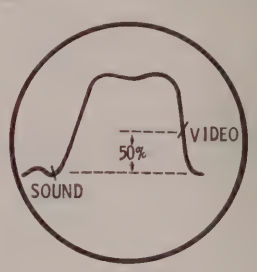
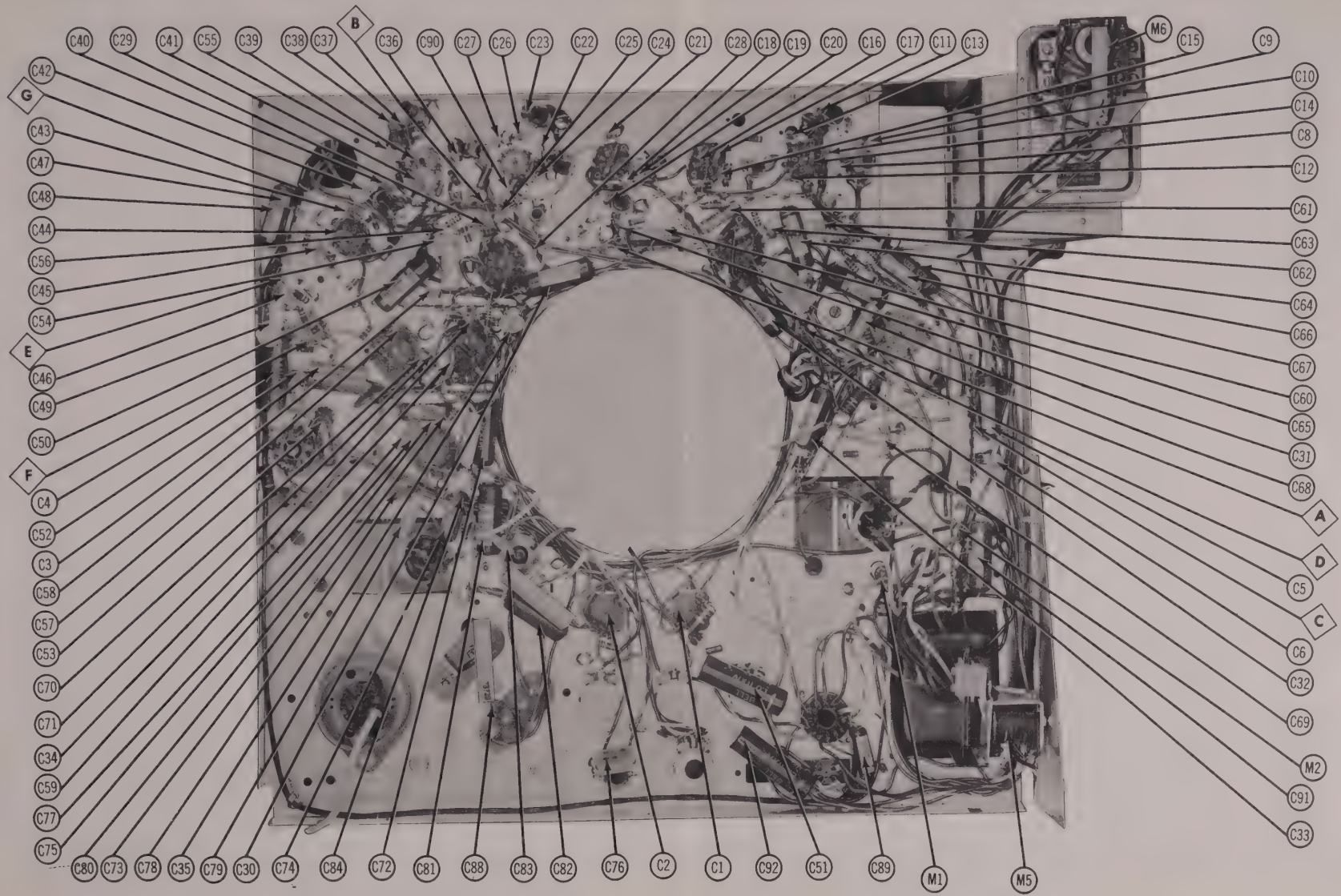


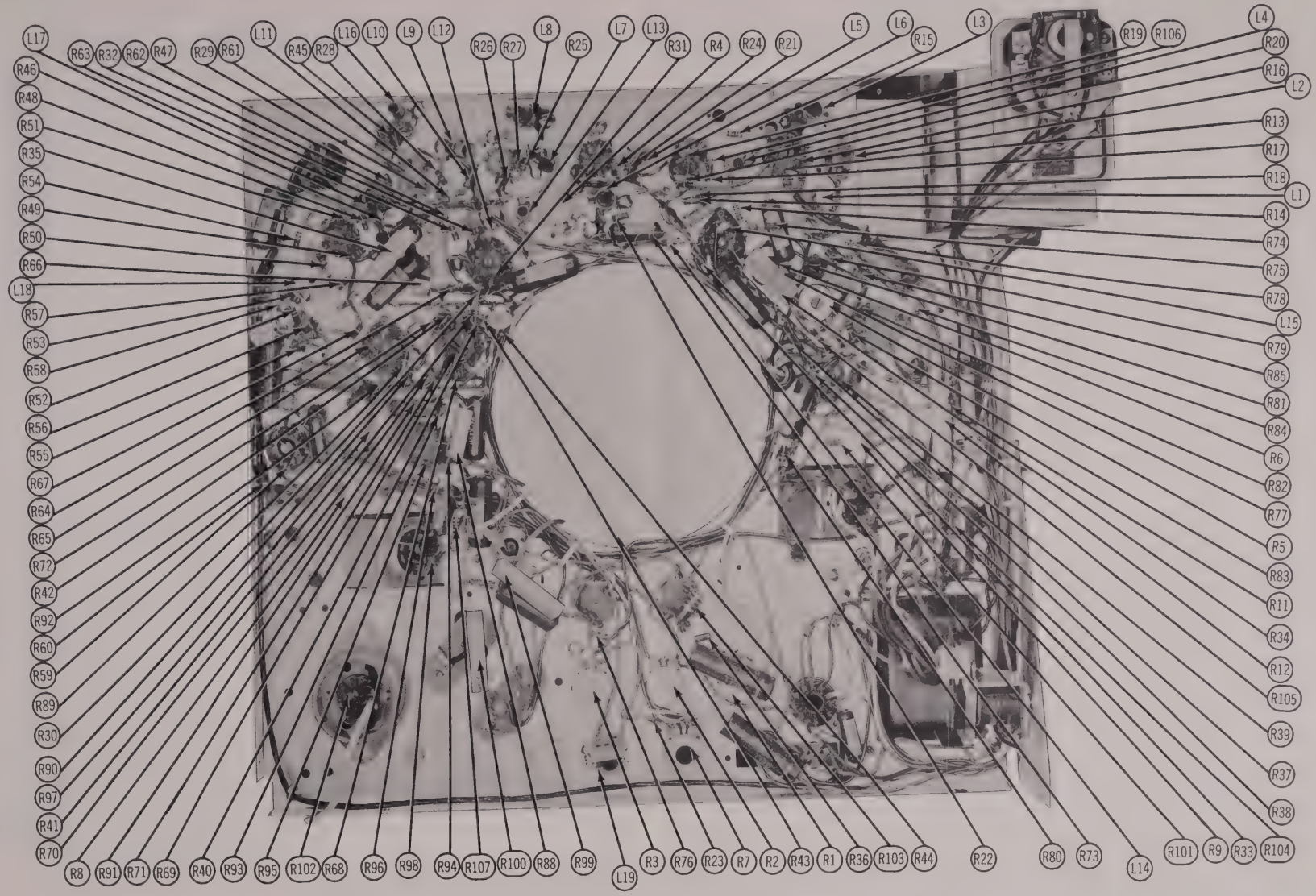
FIG. 201

VHF RF AND MIXER ALIGNMENT

This portion of the receiver has been properly aligned at the factory and is very stable. Alignment of this portion should not be required in the field.



CHASSIS BOTTOM VIEW-CAPACITOR AND ALIGNMENT IDENTIFICATION



CHASSIS BOTTOM VIEW-RESISTOR AND INDUCTOR IDENTIFICATION

REMOTE CONTROL PARTS LIST AND DESCRIPTIONS

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	Packard-Bell PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R109A	50K	½	25040B	B-32	A47-50K-Z	Q13-123	U33	Volume
B	Shaft			Not Req.	KSS-3	Not Req.	Not Req.	
C	Switch			KB-1 or KR-1*	SWE-12	76-1	US-26	
R110A	50K	½	25917B	B-31	A47-50K-S	Q11-123	U35	Brightness
B	Shaft			Not Req.	KSS-3	Not Req.	Not Req.	
R111A	50K	½	25946	B-32	A47-50K-Z	Q13-123	U33	Fine Tuning
B	Shaft			Not Req.	KSS-3	Not Req.	Not Req.	

* Use KR with CRL "red label" controls and KB with "blue label" controls.

SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	Packard-Bell PART No.	QUAM PART No.	
SP3	2½"	PM	3-4Ω	83114	25A07	

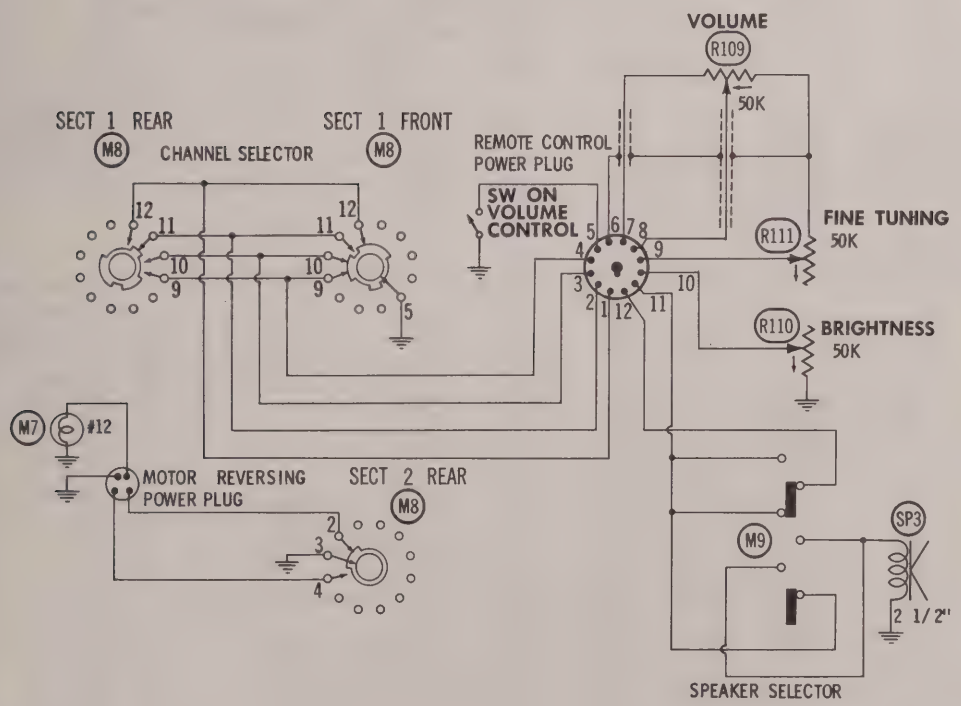
MISCELLANEOUS

ITEM No.	PART NAME	Packard-Bell PART No.	NOTES
M7	Lamp	54008	#12
M8	Switch	86063	Channel Selector (Rotary Wafer Type)
M9	Switch	86714	Remote-Set-Both (3 Position Slide Type)

CABINETS & CABINET PARTS

(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

NAME	PART NO.	DESCRIPTION
Knob	52217D	VHF Channel Selector
Knob	52220A	VHF Fine Tuning, Volume, Brightness
Cabinet	21135-1B	Grille
Cabinet	21135-2B	Shell
Cabinet	21135-3	Base



A PHOTOFACT STANDARD NOTATION SCHEMATIC

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TV PARTS LIST AND DESCRIPTIONS

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No	USE	TYPE	NOTES
V1	1st Video IF Amp	6BZ6	
V2	2nd Video IF Amp	6BZ6	
V3	3rd Video IF Amp	6BZ6	
V4	4th Video IF Amp - Video Det.	6AM8A	
V5	Video Amp - AGC Clamper	6AM8A	
V6	Video Output-Vert. Mult	6CX8	
V7	AGC Keying-Sync Phase Inv	6AN8	
V8	1st Sound IF - Noise Inv	12AX7	
V9	2nd Sound IF	6AU8	

ITEM No	USE	TYPE	NOTES
V10	Ratio Det. - AF Amp.	6BN8	
V11	Audio Output	6V6GT	
V12	Sync Sep. - Horiz. AFC	6BN8	
V13	Vert. Mult.-Vert. Output	6CZ5	
V14	Horiz. Mult.	6CG7	
V15	Horiz. Output	6CD6GA	
V16	Damper	6AU4GTA	
V17	HV Rectifier	1G3GT	
V18	LV Rectifier	5V3	5AU4 *

* Alternate.

PICTURE TUBE

ITEM No.	REPLACEMENT DATA				NOTES
	Packard-Bell PART No.	GENERAL ELECTRIC PART No	RCA PART No.	SYLVANIA PART No.	
V19	21CEP4 24AHP4		21CEP4 ① 24AHP4 ①	21CEP4 ① 24AHP4 ②	① "Silverama" ③ ② "Silver Screen 85"

ELECTROLYTIC CAPACITORS

ITEM No	RATING		REPLACEMENT DATA						
	CAP.	VOLT	Packard-Bell PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No	PYRAMID PART No	SANGAMO PART No.	SPRAGUE PART No.
C1A	▲100	350	24166	AFH2-41-50	B0332	FP227.7	TMS-81 / TD-100-450	D-177 / MT-3560	TVL-2641
B	▲100	350					TMS-82	S-232	
C2A	▲40	350	24158	AFH3-29-75	D0044	FP228.3	TD-20-350	MT-4520	TVLS-2642*
B	▲20	350							
C3	5	50	24038	PRS50Y5	BBR5-50	TT50X5	TD-5-50	MMT-0505	TVA-1303
C4	25	25	24066A	PRS25Y25	BBR25-25	TC36	TD25-25	MT-0225	TVA-1205

* Not normally in distributors stock. Available through distributor on order to manufacturer.

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP.	VOLT	Packard-Bell PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No	SPRAGUE PART No.	
C5	.1	200	23107	P288N-1	DF-104	CUB2P1	GEM-201	2TM-P1	
C6	10000		23939	BPD-01	BYA10S1	B-110	5GA-S1		
C7	5.2					DTZ-52	CNO-482	5TCCB-V2S2	NPO 5% ③
C8	2.2		23969			TCZ-2R2	CNO-532	5TCCB-V2S2 ±.25mmf *	NPO ±.25mmf
C9	22			1469-000022	DD-220	5W5Q22	MCM422	5GA-Q22	
C10	2.2		23969			TCZ-2R2	CNO-532	5TCCB-V2S2 ±.25mmf *	NPO ±.25mmf
C11	30			1469-00003	DD-300	5W5Q3		5GA-Q3	
C12	1000		23860	BPD-001	DD-102	L10D1	B-210	5HK-D1	
C13	1000		23860	BPD-001	DD-102	L10D1	B-210	5HK-D1	
C14	1000		23860	BPD-001	DD-102	L10D1	B-210	5HK-D1	
C15	1000		23860	BPD-001	DD-102	L10D1	B-210	5HK-D1	
C16	1000		23860	BPD-001	DD-102	L10D1	B-210	5HK-D1	
C17	1000		23860	BPD-001	DD-102	L10D1	B-210	5HK-D1	
C18	1000		23860	BPD-001	DD-102	L10D1	B-210	5HK-D1	
C19	2.2		23969	NPO-SI 2.2	TCZ-3R0	C10V22C	CNO-532	5TCCB-V2S	NPO
C20	30			1469-00003		5W5Q3		5GA-Q3	
C21	1000		23860	BPD-001	DD-102	L10D1	B-210	5HK-D1	
C22	4.7		23978	NPO-SI 4.7	TCZ-4R7	CTA6Q47C	ZT-5547	5TCCB-V4S8 10% *	NPO 10%
C23	22			1469-000022		5W5Q22	MCM422	5GA-Q22	
C24	1000		23860	BPD-001	DD-102	L10D1	B-210	5HK-D1	
C25	1000		23860	BPD-001	DD-102	L10D1	B-210	5HK-D1	
C26	1000		23860	BPD-001	DD-102	L10D1	B-210	5HK-D1	
C27	10		23836		TCZ-10		CNO-410	5TCC-Q4S 5% *	NPO 5%
C28	10		23836		TCZ-10		CNO-410	5TCC-Q4S 5% *	NPO 5%
C29	5000		23931	BPD-005	DD-502	L10D5	B-250	5HK-D5	
C30	.1	600	23145	P688N-1	DF-104	CUB6P1	GEM-601	6TM-P1	
C31	330		23944	BPD-00033	DD-331	L10T33	B-333	5GA-T33	
C32	.1	600	23145	P688N-1	DF-104	CUB6P1	GEM-601	6TM-P1	
C33	.1	600	23145	P688N-1	DF-104	CUB6P1	GEM-601	6TM-P1	
C34	10000		23939	BPD-01	DD-103	BYA10S1	B-110	5GA-S1	
C35	10000		23939	BPD-01	DD-103	BYA10S1	B-110	5GA-S1	
C36	5.6		23908	NPO-DI 5		C10V5C	ZT-555		NPO
C37	75			N750-DI 75	TCN-75	C10Q75U	NT-5475	5TCU-Q7S± 10%*	N750 10%
C38	100		23941		TCZ-100	CTA5T1C	CNO-310	5TCC-T1S 5%*	NPO 5%
C39	15		23803	NPO- DI 15	DTZ-15	CTA6Q15C	CNO-415	5TCC-Q15S 10% *	NPO 10%
C40	5000		23931	BPD-001	DD-502	L10D5	B-250	5GA-D5	
C41	10000		23939	BPD-01	DD-103	BYA10S1	B-110	5GA-S1	
C42	47		23833	NPO-DI 47	TCZ-47	C10Q47C	CNO-447	5TCC-Q4T8 10%*	NPO 10%
C43	10000		23939	BPD-01	DD-103	BYA10S1	B-110	5GA-S1	
C44	1500		23839			L1J5S	J-L-215	5GA-D3S	
C45	10000		23939	BPD-01	DD-103	BYA10S1	B-110	5GA-S1S 10% *	10%
C46	1200		23889			L10D12	JL-212	5GA-D12	
C47	2000		23974	BPD-002	DD-202	L10D2	B-220	5GA-D2S 10% *	10%
C48	.1	200	23107	P288N-1	DF-104	CUB2P1	GEM-201	2TM-P1	③
C49	10000		23939	BPD-01	DD-103	BYA10S1	B-110	5GA-S1	
C50	.1	600	23145	P688N-1	DF-104	CUB6P1	GEM-601	6TM-P1	
C51	1.0	100	23940	P288N-1.0		CUB2W1	GEM-21	2TM-M1	
C52	.022	400	23122	P488N-022	DD-203	CUB4S22	GEM-4122	4TM-S22	
C53	.0047	600	23127	P688N-0047	DD-472	CUB6D47	GEM-6247	6TM-D47	
C54	10000		23939	BPD-01	DD-103	BYA10S1	B-110	5GA-S1	
C55	10000		23939	BPD-01	DD-103	BYA10S1	B-110	5GA-S1	
C56	.1	200	23107	P288N-1	DF-104	CUB2P1	GEM-201	2TM-P1	
C57	10000		23939	BPD-01	DD-103	BYA10S1	B-110	5GA-S1	
C58	470		23916	SI 470	DD-471	LT6T47	UC-5347	5GA-T47	
C59	10000		23939	BPD-01	DD-103	BYA10S1	B-110	5GA-S1	
C60	.01	600	23139	P268N-01	DD-103	CUB6S1	GEM-511	6TM-S1	
C61	.0033	600	23336				GEM-16233	6TM-D33S 10% *	10%
C62	470		23916	SI 470	DD-471	LT6T47	UC-5347	5GA-T47	
C63	.0022	400	23316				GEM-16223	5BF-D22	10%
C64	.047	600	23143	P688N-047	DF-503	CUB4S47	GEM-6147	6TM-S47	
C65	.1	600	23145	P688N-1	DF-104	CUB6P1	GEM-601	6TM-P1	
C66	.033	600	23143	P688N-033	DF-303	CUB6S33	GEM-6133	6TM-S33	
C67	.001	1000	23753				GEM-1621	10TM-D1S 10% *	10%

CAPACITORS (cont)

ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP.	VOLT	Packard-Bell PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	SPRAGUE PART No.	
C68	.001	600	23133	P688N-001	D6-102	CUB6D1	GEM-621	6TM-D1	
C69	.001	1000	23753				GEM-1621	10TM-D1S 10% *	10%
C70	1500		23936	BPD-0015	DD-152	L10D15	B-215	5GA-D15	
C71	1500		23936	BPD-0015	DD-152	L10D15	B-215	5GA-D15	
C72	.033	1000	23074	P1088N-033	DF-303	CUB10S33	GEM-10133	10TM-S33	
C73	5000		23953	BPD-006	DD-502	L10D6	B-250	5GA-D6	
C74	.047	200	23105	P288N-047	DF-503	CUB2S47	GEM-4147	2TM-S47	
C75	91		23819		TCZ-5R	C10Q91C			NPO 5%
C76	4000		23208	1484-004		1W5D4	MCB-463	5GA-D4S 10% *	10%
C77	470		23236	1464-00047		5R5T47		5GA-T47S 5% *	5%
C78	330		23221	1469-00033	DD-331	5R5T33		5GA-T33S 10%*	10%
C79	.0022	600	23135	P688N-0022	DD-222	CUB6D22	GEM-6222	6TM-D22	
C80	.047	200	23105	P288N-047	DF-503	CUB2S47	GEM-4147	2TM-S47	
C81	.1	600	23145	P688N-1	DF-104	CUB6P1	GEM-601	6TM-P1	
C82	.1	600	23145	P688N-1	DF-104	CUB6P1	GEM-601	6TM-P1	
C83	.001	2500	23958		DD30-201	HVB30T2		30GA-T2	
C84	200	2500	23958		DD30-201	HVB30T2		30GA-T2	
C85	100	2000			DD30-101	HVB20T1	2HV-310	30GA-T1	
C86	120	2000			DD30-121	HVB20T2	2HV-312	30GA-T12	
C87	120	2000			DD30-121	HVB20T2	2HV-312	30GA-T12	
C88	470	1000	23967	HVD-15-470	DD-471	L10T47	JL-347	10GAB-T47	
C89	.047	200	23105	P288N-047	DF-503	CUB2S47	GEM-4147	2TM-S47	③
C90	10000		23939	BPD-01	DD-103	BYA10S1	B-110	5GA-S1	
C91	.1	600	23745	P688N-1	DF-104	CUB6P1	GEM-601	6TM-P1	
C92	1.0	100	23040	P288N-1.0		CUB2W1	GEM-21	2TM-M1	

① UHF versions of Ch. 98D6 uses .047mfd ⑤ 500V in this application (Part #23143).
② Not used in some versions. ③ Not used in Ch. 98D6.
* Not normally in distributors stock. Available through distributor on order to manufacturer.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	Packard-Bell PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1	1000Ω	½	25904A	B-505		Q17-108	U3	Contrast
R2A	500Ω	½	25527	B-4	A47-500-S	Q11-103	U2	Tone, Note 1
B	Shaft			Not Req.	K38-3	Not Req.	Not Req.	
R3A	3meg	½	25954	B-54	A47-3meg-S	Q11-140	U39	Vert. Hold
B	Shaft			Not Req.	K38-3	Not Req.	Not Req.	
R4A	50K	½	25946	B-32	A47-50K-Z	Q13-133	U33	Picture Fidelity
B	Shaft			Not Req.	K38-3	Not Req.	Not Req.	
R5A	3meg	½	25867	AB-54	A47-3meg-S	B11-140	TA36L	Vert. Linearity
B	Shaft			AK-1	FK3-1/4	TM1	Not Req.	
R6A	5meg	½	25R10	AB-S7	A47-5meg-S	B11-141	PTA56L	Height
B	Shaft			AK-1	FK3-1/4	TM1	Not Req.	
R7A	150K	½	25968	F1-53 †		◆◆Q7-981	◆◆	ANI
B	50K	½		R23-39 †				AGC
R8A	25K	½	25857	AB-26	A47-25K-S	B11-120	TA25L	Horiz. Drive
B	Shaft			AK-1	FK3-1/4	TM1	Not Req.	
R9A	3meg	½	25867	AB-54	A47-3meg-S	B11-140	TA36L	Focus
B	Shaft			AK-1	FK3-1/4	TM1	Not Req.	
R10A	500K	½	25969	B-50	A47-500K-Z	Q13-133	U48	Phono Volume, Note 2
B	Shaft			Not Req.	K38-3	Not Req.	Not Req.	

†† Cut shaft to length and slot before assembling control.
◆ "Concentrikit" Equivalent: K-8 Kit, Base Elements & Shafts B11-328, P17-028 (Panel)
(Not available as a factory assembled control.) B11-123, R15-006 (Rear)
◆◆ "ZTA-LOC" Equivalent: FB154L, Q8500, RU54L, 19437.
Note 1. Ch. 98D6 uses a dual volume and tone control with switch (Part #25967).
Note 2. Not used in some versions.

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING		REPLACEMENT DATA	NOTES
	OHMS	WATT	Packard-Bell PART No.	
R11	1meg		73161	
R12	6800Ω 5%	7	73729	Note 1
R13	33000Ω		73031	
R14	120Ω		73014	
R15	470Ω		73021	
R16	56Ω		73010	
R17	12K		73038	
R18	120K		73050	
R19	470Ω		73021	
R20	120K		73050	
R21	6800Ω		73035	
R22	120Ω		73014	
R23	15K		73039	
R24	56Ω		73010	
R25	3300Ω		73031	
R26	1000Ω		73025	
R27	180Ω		73016	
R28	560Ω		73022	
R29	2200Ω		73029	
R30	1500Ω		73027	
R31	1200Ω		73026	
R32	68Ω		73011	
R33	220K		73153	
R34	39000	7	73715	
R35	3000Ω 5%	10	73730	Note 2
R36	100Ω		73013	
R37	220K		73153	
R38	100K		73047	
R39	62K	2	73448	
R40	47K		73045	
R41	270K		73054	
R42	3300Ω		73031	
R43	390K		73056	
R44	2.2meg		73065	
R45	100K		73149	
R46	1000Ω		73025	
R47	68Ω		73011	
R48	100K		73149	
R49	3300Ω		73031	
R50	15K		73039	
R51	120Ω		73014	

ITEM No.	RATING		REPLACEMENT DATA	NOTES
	OHMS	WATT	Packard-Bell PART No.	
R52	12K		73038	
R53	12K		73038	
R54	10K		73037	Note 3
R55	4.7meg		73189	
R56	220K		73153	
R57	220K		73153	
R58	18Ω		73004	
R59	470K		73157	
R60	56Ω	2	73422	
R61	47K		73045	
R62	33K		73043	
R63	100K		73149	
R64	22K		73041	
R65	2.2meg		73065	
R66	270K		73054	
R67	100K		73049	
R68	150K		73051	
R69	1meg		73161	
R70	3300Ω		73031	
R71	33000		73031	
R72	2700Ω		73030	
R73	22K		73041	
R74	68K		73047	
R75	2.2meg		73065	
R76	3.3meg		73067	
R77	1meg		73161	
R78	68K		73047	
R79	27K		73042	
R80	4.7meg		73189	
R81	1meg		73161	
R82	1.5meg		73163	
R83	470K		73157	
R84	22K		73041	
R85	33K		73043	
R86	220Ω			
R87	220Ω			
R88	15Ω 5%	5	73735	
R89	100K 5%		73049-1	
R90	100K 5%		73049-1	
R91	470K		73157	
R92	1.5meg		73163	

RESISTORS (cont)

ITEM No.	RATING		REPLACEMENT DATA	NOTES
	OHMS	WATT	Packard-Bell PART No.	
R93	6800Ω		73035	
R94	1500Ω		73027	
R95	100K 5%		73049-1	
R96	150K		73051	
R97	6800Ω		73035	
R98	560K		73058	
R99	12K	10	73705	
R100	6800Ω 5%	7	73729	Note 4

ITEM No	RATING		REPLACEMENT DATA	NOTES
	OHMS	WATT	Packard-Bell PART No.	
R101	1meg		73181	
R102	2.2M 5%	1	73719	
R103	470Ω	2	73421	
R104	27Ω		73006	Note 5
R105	150K		73051	Note 4
R106	100Ω		73013	
R107	47000Ω		73033	Note 4
R108	2.2Ω			

Note 1. The VHF version of Ch. 98D6 uses 5600Ω 5% TW (Part #73731), and the UHF versions of Ch. 98D6 uses 2700Ω, 1 W (Part #73330).
Note 2. Ch. 98D6 uses 2500Ω 10W (Part #73637).
Note 3. Ch. 98D6 uses 39K in this application (Part #73044).
Note 4. Not used in some versions.
Note 5. Not used in Ch. 98D6.

COILS (RF-IF)

ITEM No	USE	REPLACEMENT DATA					NOTES
		Packard-Bell PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No.	
L1	1st Video IF	29564	17-6534	TV-131		VF-4	
L2	47.25MC Trap	29564A			6225		
L3	39.75MC Trap	29565A			6225		
L4	2nd Video IF	29565	17-6523	TV-130	6219	VF-3	
L5	3rd Video IF	29565	17-6523	TV-130	6219	VF-3	
L6	41.25MC Trap	29566A			6225		
L7	4th Video IF	29564A	17-6523	TV-130	6219	VF-3	
L8	47.25MC Trap	29564A			6225		
L9	5th Video IF	29567B	17-6523	TV-130	6219	VF-3	
L10	RF Choke	29568	19-1005	BC-566	6813		10 Microhenries
L11	Shunt Peaking Coil	29509	19-3150	TV-185	6181	VP-6	250 Microhenries
L12	Series Peaking Coil	29553	19-3083 ■	TV-181 ■	6177 ■	VP-3 ■	93 Microhenries, wound on 3900Ω resistor
L13	4.5MC Trap	29548A			1470 ††		
L14	Series Peaking Coil	29506	19-3125 ▲	TV-182	6178	VP-4 ▲	130 Microhenries, wound on 22K resistor
L15	Shunt Peaking Coil	29508	19-4180	TV-183	6179	VP-5 *	180 Microhenries, wound on 39K resistor
L16	1st Sound IF	29053C		TV-119 ††			
L17	2nd Sound IF	29576A	17-1021 ▲	TV-113 †	1470-A		
L18	Ratio Detector	29694	17-3477				

■ Parallel with 3900Ω resistor.
†† Disregard tap.
▲ Parallel with 22K resistor.
* Parallel with 39K resistor.
◆ Use one winding only.
† Use adapter plate and one winding only.

TRANSFORMER (HORIZ. OSC.)

ITEM No.	DC RES.		REPLACEMENT DATA						NOTES
	PRI.	SEC.	Packard-Bell PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No.	Thordarson PART No.	
L19	74Ω		29703		TV-165 ▲	6211 ▲	H-102	H8-7	Horiz. Freq. ▲ Disregard tap.

FILTER CHOKE

ITEM No.	RATINGS			REPLACEMENT DATA						
	CURRENT (Measured)	DC RES.	INDUCTANCE @ 1 CPS 1000 (^)	Packard-Bell PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No
L20	.340A	38Ω	.9 Hy.	27006D	C5037	C-2996		C-2526	26C44	C-27X

TRANSFORMER (POWER)

ITEM No.	RATING			REPLACEMENT DATA						
	PRI.	SEC. 1	SEC. 2	Packard-Bell PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No
T1	117V @ 2A	580VCT @ 340A	5V @ 3.8A	29076		P-3055			26R92	
	SEC. 3	SEC. 4	SEC. 5							
	6.3V @ 10.6A									

TRANSFORMER (REMOTE CONTROL)

ITEM No.	RATING			REPLACEMENT DATA						
	PRI.	SEC. 1	SEC. 2	Packard-Bell PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T2	117V @ .32A	24V @ 1.7A		29060B ①						

① Not used in Ch. 98D6.

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No.	USE	REPLACEMENT DATA							
		Packard-Bell PART No	Halldorson PART No	Merit PART No.	Ram PART No.	Rogers PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No
T3	Vert. Output	29483			V-319		VO-101	26S24	A-113X ①
T4	Yoke-Horiz. (18.6MH) (110°)-Vert (15MH)	29696 ②			Y-110 ③		DY-26A	T-52	T-50-2
	Rear Cover & Centering Device	34071							
	Alt. Rear Cover & Centering Device	34092							
T5	Horiz. Output	29488							

① Connect as autoformer.
② Includes C85, C86, C87, R86, R87 and R108.
③ Connect yoke terminal #2 to terminal #4 of T5, yoke terminal #3 to R107, yoke terminal #10 to junction of C72 and C83.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	Packard-Bell PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T6	4500Ω	3-4Ω	29436D		Z1107	A-2930	AU-601	A-3677	24S51	S-51X

PACKARD-BELL MODELS 21DC9, 21DC10, 21DT4, 24DC5 (Ch. 98D4, 98D5, RM-201)

FOLDER 1

TV PARTS LIST AND DESCRIPTIONS (Continued)

SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	Packard-Bell PART No.	QUAM PART No.	
SP1	4"	PM	6-8Ω	83017 ①⑤	4A07Z6.8 ⑤	① Used in Models 21DC9, 24DC5
SP2	4"	PM	6-8Ω	83017 ① ⑤	4A07Z6.8 ⑤	② Used in Model 21DT4
	4"	PM	3-4Ω	83014 ②	4A07	③ Two used in Model 21DC10
	4"	PM		83014B ③ ⑤		④ Used in Model 24DC5
	6" x 9"	PM	6-8Ω	83113 ③ ⑤	69A1Z6 ⑤	⑤ Parallel and phase
	2" x10"	PM		83124 ④ ⑤		

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			Packard-Bell PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M1	N	3/4A 125V S/B	45040		333.750 (N 3/4 125V S/B)	346010	N 3/4	HN 1/2 to 3/4
M2	1" Length of #26 Wire ①							

① Not used in some versions.

MISCELLANEOUS

ITEM No.	PART NAME	Packard-Bell PART No.	NOTES
M3	Tuner	10593G	VHF, Ch. 98D4
	Tuner	10616A	VHF, Ch. 98D5
	Tuner	10609	UHF-VHF, Ch. 98D5
M4	Switch	86057	Channel Selector (Rotary Wafer Type) Not used in some versions.
M5	Relay	PB72018A	Power, Not used in some versions
M6	Motor		Tuner Drive, 24 volts, Not used used in some versions
	Lamp	54002	#47, Model 21DT4

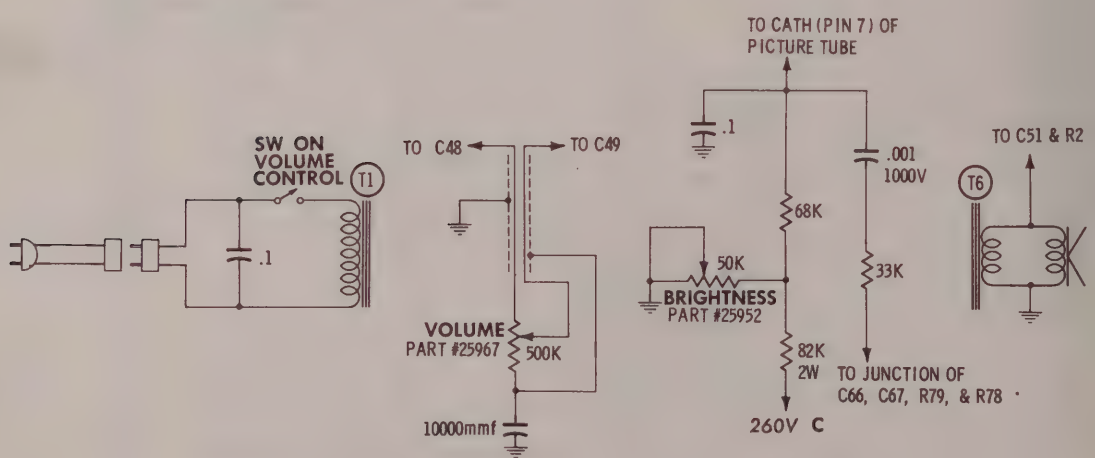
CABINETS & CABINET PARTS

(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

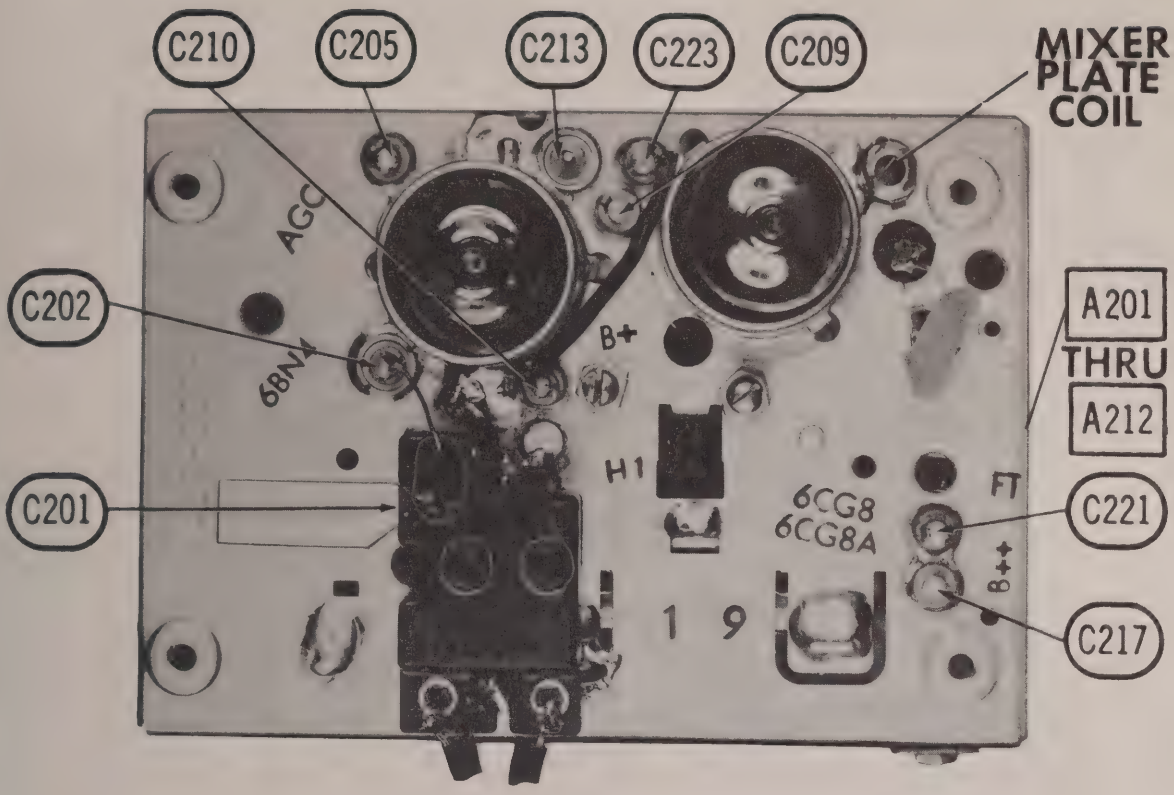
NAME	PART NO.	DESCRIPTION
Safety Glass	55090	All 21" Models
Safety Glass	55096	All 24" Models
Mask	55106A	All 21" Models
Mask	55107A	All 24" Models
Knob	52208	VHF Channel Selector, Model 21DT4
Knob	52224	VHF-UHF Channel Selector, Model 21DT4
Knob	52225	VHF-UHF Channel Selector, Model 21DT4
Knob	52209A	VHF Fine Tuning, Model 21DT4
Knob	52223	VHF-UHF Fine Tuning, Model 21DT4
Knob	52211	Volume, Model 21DT4
Knob	52213	Brightness, Vert. Hold, Model 21DT4
Knob	52248A	Tone, Model 21DT4
Knob	52257	Contrast, Tone, Vert. Hold, Models 21DC9, 21DC10, 21DT4, 24DC5
Knob	52183A	Picture Fidelity, Models 21DT4, 21DC9, 21DC10, 24DC5

WIRING DATA

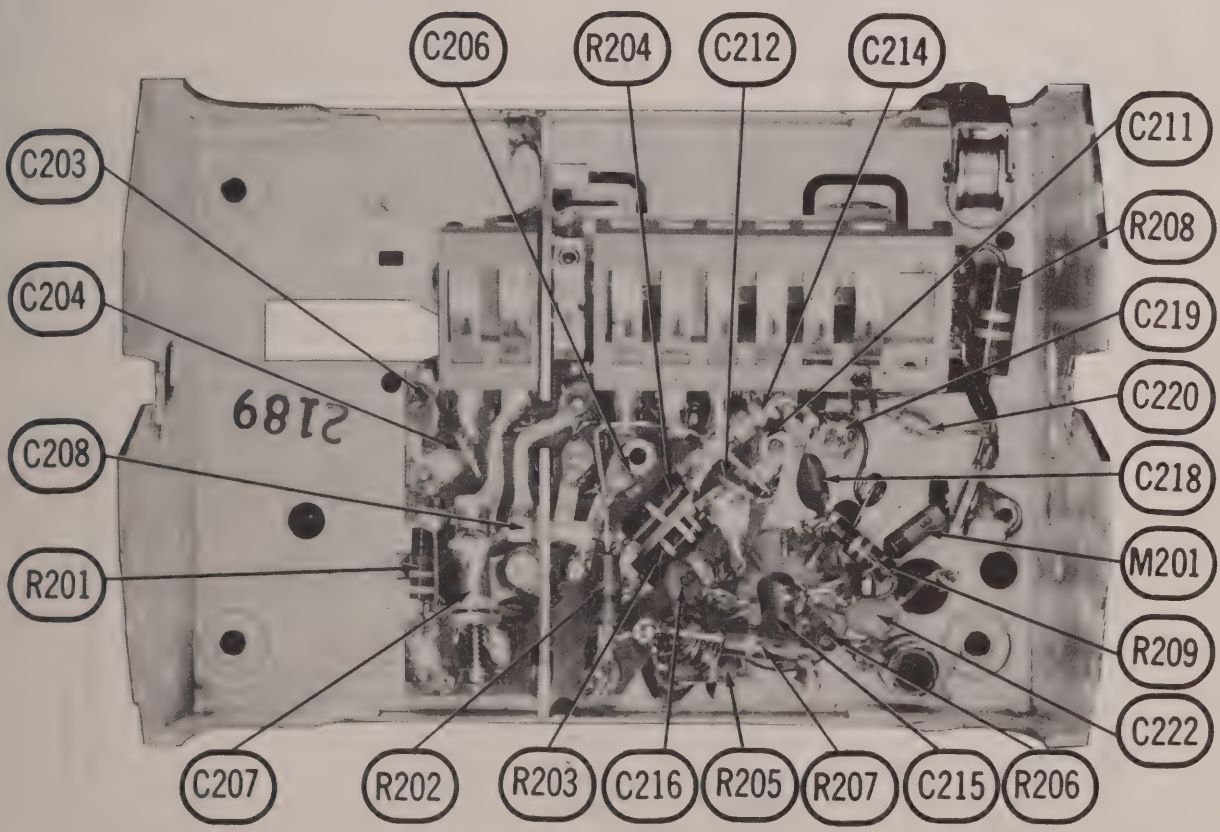
High Voltage Lead	Use BELDEN No. 8869
Shielded Hook-up Wire	Use BELDEN No. 8885 (Single Conductor)
	8738 (Two Conductor)
General-use Unshielded Hook-up Wire	Use BELDEN No. 8530 (Solid) Available in Ten Colors
	8524 (Stranded) Available in Ten Colors
Power Cord (Interlock Type)	Use BELDEN No. 8874
300Ω Tuner Input Lead	Use BELDEN No. 8225
300Ω Antenna Lead-in	Use BELDEN No. 8230 or 8275
Antenna Rotor Cable	Use BELDEN No. 8464 (Flat) or 8484 (Round) - 4 Conductor
	8485 (Round) - 5 Conductor
	8488 (Round) - 8 Conductor



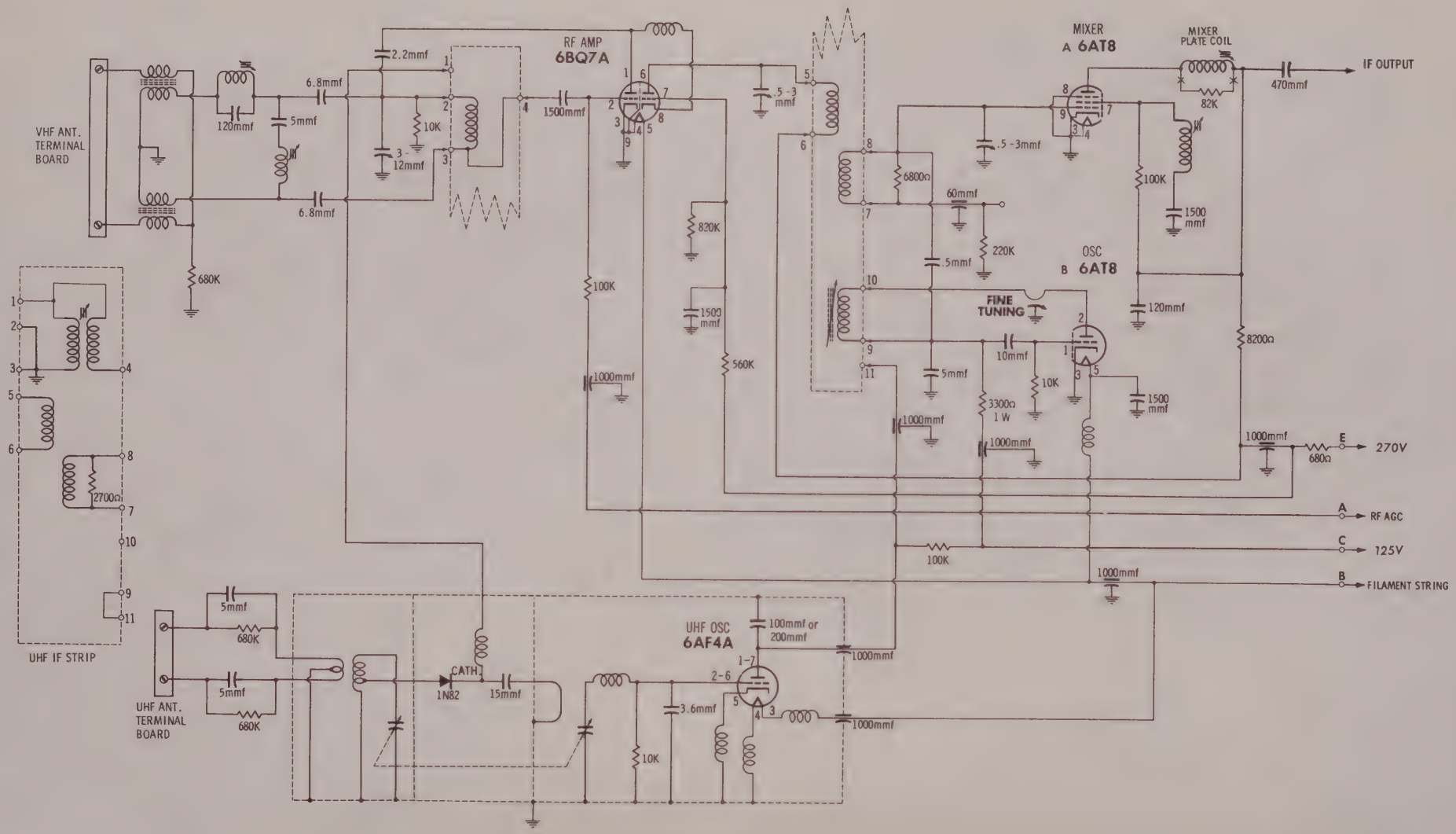
ALTERNATE CIRCUITS CH98D5



TUNER 10593G - TOP VIEW



TUNER 10593G - BOTTOM VIEW



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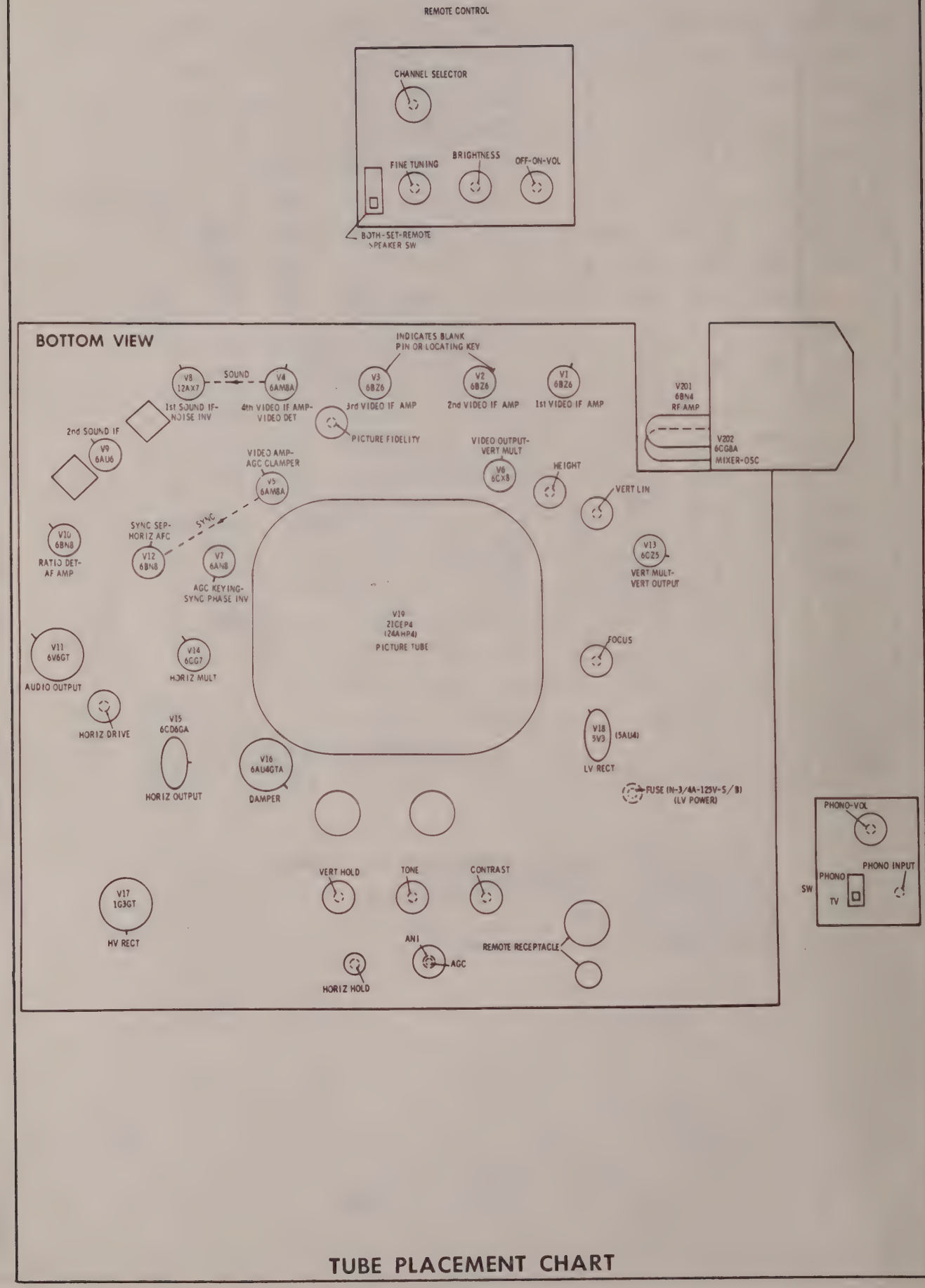
UHF-VHF TUNER 10609

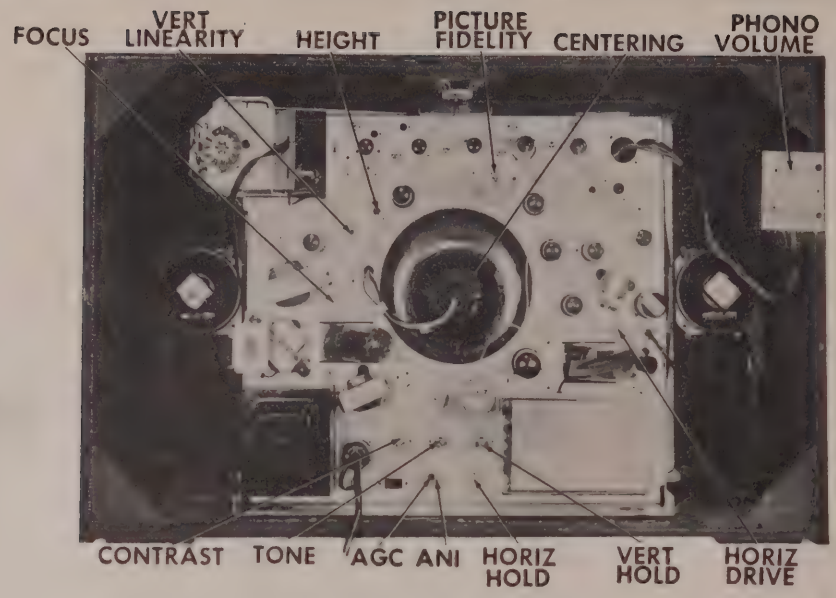
RESISTANCE MEASUREMENTS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	6BZ6	• 53K	56Ω	0Ω	.1Ω	†† 470Ω	†† 470Ω	0Ω		
V2	6BZ6	60K	†† 100Ω	0Ω	.1Ω	† 470Ω	† 470Ω	INF		
V3	6BZ6	• 50K	56Ω	0Ω	.1Ω	† 3000Ω	† 3000Ω	0Ω		
V4	6AM8A	180Ω	.1Ω	† 4000Ω	0Ω	.1Ω	† 4000Ω	.1Ω	2800Ω	0Ω
V5	6AM8A	68Ω	2800Ω	† 3000Ω	0Ω	.1Ω	† 5700Ω	0Ω	500K	0Ω
V6	6CX8	0Ω	• 1.4meg	• ǂ 3.3meg	.1Ω	0Ω	• 280Ω	220K	† 3000Ω	† 3900Ω
V7	6AN8	† 9600Ω	† 1meg	2700Ω	.1Ω	0Ω	280K	† 0Ω	† 50K	† 3000Ω
V8	12AX7	† 100K	• 210K	2200Ω	.1Ω	.1Ω	† 4000Ω	100K	68Ω	0Ω
V9	6AU6	100K	0Ω	0Ω	.1Ω	† 6000Ω	† 21K	120Ω		
V10	6BN8	INF	0Ω	INF	.1Ω	0Ω	24K	† 440K	4.7meg	18Ω
V11	6V6GT	TP	.1Ω	† 428Ω	† 0Ω	470K	TP	0Ω	560Ω	
V12	6BN8	1.6meg	15Ω	1.6meg	.1Ω	0Ω	15Ω	† 60K	2.2meg	0Ω
V13	6CZ5	† 470Ω	NC	• 2.5meg	0Ω	.1Ω	• 2.5meg	0Ω	NC	† 870Ω
V14	6CG7	† 6900Ω	2meg	1500Ω	.1Ω	0Ω	† 150K	100K	1500Ω	0Ω
V15	6CD6GA	TP	0Ω	0Ω	NC	740K	NC	.1Ω	† 12K	TOP CAP ǂ 16Ω
V16	6AU4GTA	NC	TP	¶ 2.3meg	NC	† 0Ω	NC	.1Ω	0Ω	
V17	1G3GT	PINS 1 THRU 8 HAVE INFINITE RESISTANCE								TOP CAP ǂ 346Ω
V18	5V3	NC	¶	NC	21Ω	NC	20Ω	NC	¶	
V19	21CEP4	0Ω	220K	ǂ 780Ω	• ǂ 1.6meg	NC	NC	100K	.1Ω	
V201	6BN4	0Ω	1.3meg	0Ω	.1Ω	† 7800Ω	0Ω	1.3meg		
V202	6CG8A	10K	† 18K	0Ω	0Ω	.1Ω	† 7800Ω	† 17K	0Ω	220K
ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9

¶ THIS READING WILL VARY DEPENDING UPON THE CONDITION OF THE ELECTROLYTIC CAPACITOR CONNECTED IN THE ASSOCIATED CIRCUIT.
• THIS READING WILL VARY. CONTROL SET FOR NORMAL OPERATION.
† MEASURED FROM 260 V "C" SOURCE.
†† MEASURED FROM PIN 7 OF V2. NC NO CONNECTION.
ǂ MEASURED FROM PIN 3 OF V16. TP TIE POINT.



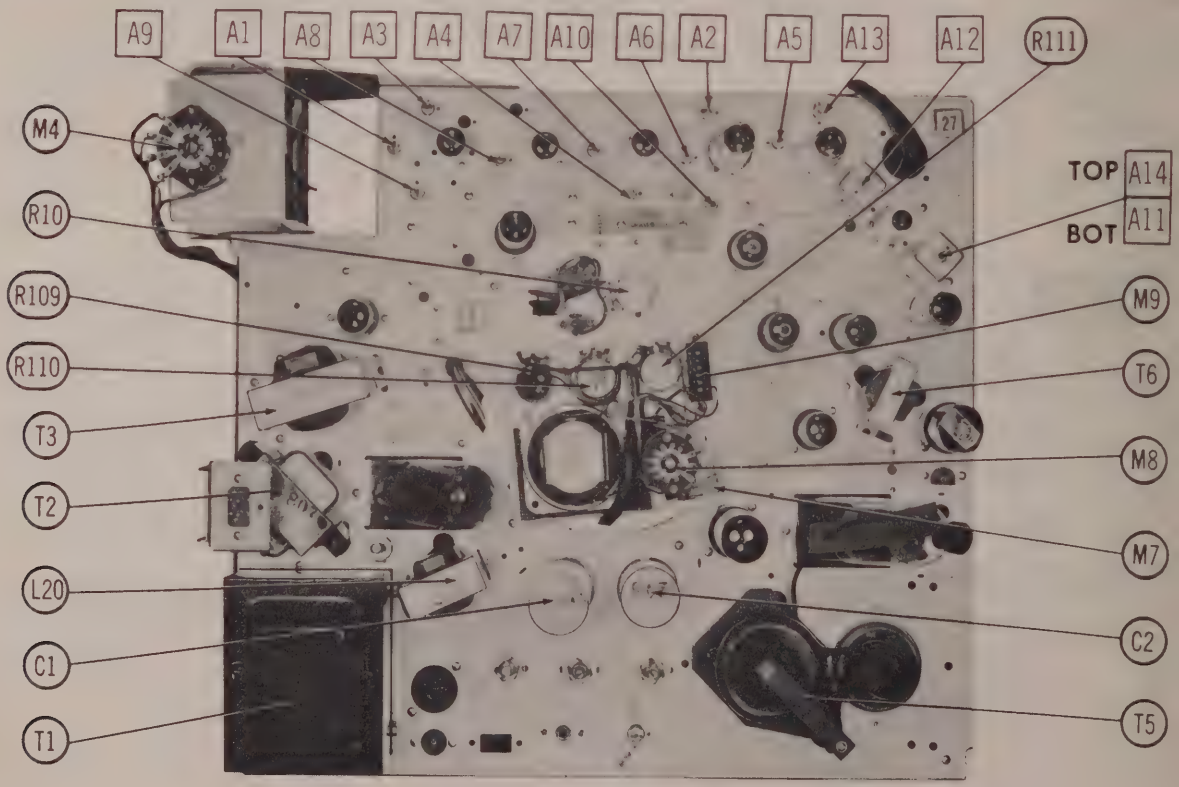
TUBE PLACEMENT CHART



CABINET—REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

1. Turn set on and tune in a TV station, preferably with a test pattern.
2. Set the Brightness and Contrast for a normal picture.
3. Turn the Horizontal Hold clockwise until the picture loses sync. It may be necessary to switch off channel and back again for picture to lose sync.
4. Turn the Horizontal Hold slowly counterclockwise until the picture just falls into sync.
5. Turn to an unused channel. If vertical lines appear near the center of the screen, slowly adjust the Horizontal Drive until white lines disappear.
6. If in step 5 the Horizontal Drive was adjusted, tune in a TV station, and repeat steps 3 and 4. Check horizontal sync by switching off channel and back again.



CHASSIS TOP VIEW

PHOTOFACT* Folder

with CIRCUITRACE*

PHILCO MODELS G4231E, L, G4234S, SL, SM, G4640L, W, G4660, UG4231E, L, UG4234S, SL, SM, UG4640L, W, UG4660 (Ch. 9L35, U)

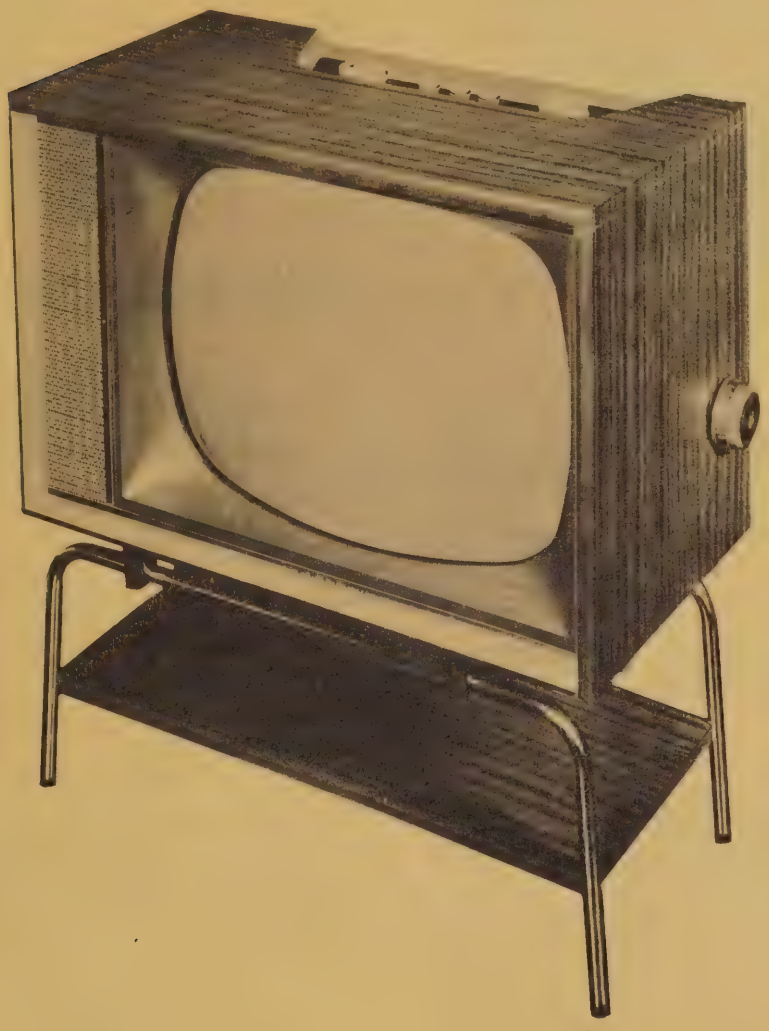
IMPORTANT FILING NOTICE

The TV Folder for this envelope will be found among the first folders in this complete Set of folders.

Merely insert the corresponding folder on this model in this envelope to retain proper filing and indexing order.

PHILCO MODELS G4231E, L, G4234S, SL, SM, G4640L, W, G4660, UG4231E, L, UG4234S, SL, SM, UG4640L, W, UG4660 (Ch. 9L35, U)

PHILCO MODELS G4231E, L, G4234S, SL, SM, G4640L, W, G4660, UG4231E, L, UG4234S, SL, SM, UG4640L, W, UG4660 (Ch. 9L35, U)



MODEL UG4234SM (CH. 9L35U)

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

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PHOTOFACT* Folder

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*TRADE MARK

EIA MEMBER ELECTRONIC INDUSTRIES ASSOCIATION

PHILCO MODELS G4231E, L, G4234S, SL, SM, G4640L, W, G4660, UG4231E, L, UG4234S, SL, SM, UG4640L, W, UG4660 (Ch. 9L35, U)

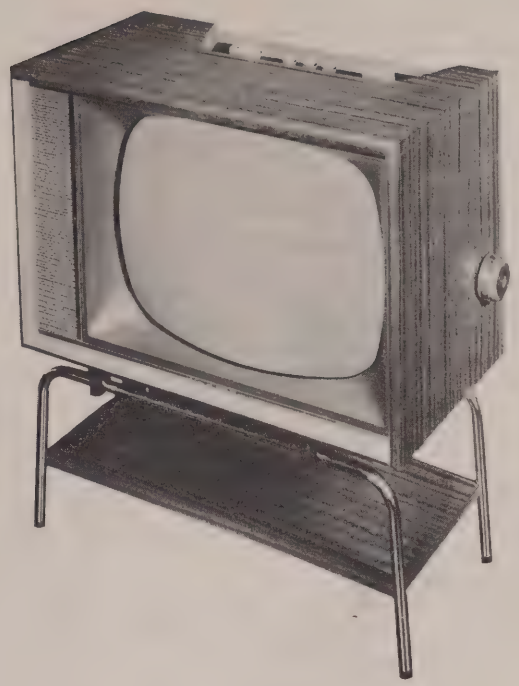
DISASSEMBLY INSTRUCTIONS

CHASSIS REMOVAL

1. Remove 7 push-on type knobs from top and 1 side knob.
2. Remove 8 wood screws holding rear cover. Remove rear cover.
3. Remove speaker leads and pilot lamp.
4. Remove 2 wood screws holding Fringe switch bracket to cabinet.
5. Remove 2 wood screws holding top control panel bracket.
6. Remove 3 wood screws holding safety glass metal trim. Remove safety glass.
7. Remove 1 screw holding mask. Remove mask.
8. Remove 4 metal screws holding top and bottom chassis brackets.
9. Remove 4 hex nuts holding picture tube mounting brackets.
10. Remove chassis and picture tube assembly from front of cabinet using caution not to damage bottom metal trim.

CAUTION NOTE

ONE SIDE OF AC LINE CONNECTED TO CHASSIS
Care should be exercised when connecting test equipment or physically contacting the chassis.



MODEL UG4234SM (CH. 9L35U)

TRADE NAME	Philco	MODELS	CHASSIS
		G4231E, L, G4234S, SL, SM, G4640L, W, G4660	9L35
		UG4231E, L, UG4234S, SL, SM, UG4640L, W, UG4660	9L35U
MANUFACTURER	Philco Corp., Tioga &"C" Streets, Philadelphia, Pa.		
TYPE SET	Television Receiver		
TUBES	Seventeen		
POWER SUPPLY	105-120 Volts AC, 60 Cycle	RATING 155 Watts, 1.5 Amp. @ 117 Volts AC	
TUNING RANGE	Channels 2 thru 13 VHF, 14 thru 83 UHF, Video IF 45.75MC, Sound IF 41.25MC (Intercarrier)		

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

Touch-up adjustment of the VHF Oscillator is possible by removing the Channel Selector and Fine Tuning knobs. Set the Fine Tuning at the center of its range. The adjustments (located in a circle around the shaft) should be made in sequence from the highest to the lowest channel in the area. Channel 13 adjustment is located at 12 o'clock, proceed in a counterclockwise direction adjusting for best picture and sound.

PICTURE TUBE SAFETY GLASS CLEANING

Remove 3 wood screws holding safety glass metal trim. Lift safety glass up and out.

SPECIAL ADJUSTMENTS

A. AGC
The IF AGC may be varied by means of a Fringe switch. (For location, see tube placement chart.)

B. Focus
The focus may be varied in steps by the position of a plug in the Focus Adjustment board.

C. Width
The width may be varied by Width control. (For location, see tube placement chart.)

D. Vertical
The Height adjustment is located under the Vertical knob, and Vert. Lin. under the Brightness knob.

HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

Set the Horizontal Hold to the center of its range and adjust the Horizontal Range (located under the Horiz. Hold knob) until the picture synchronizes horizontally.

SOUND IF DETECTOR BUZZ ADJUSTMENT

To eliminate intercarrier buzz, adjust the Buzz control for MINIMUM buzz and maximum sound. (For location, see tube placement chart.)

FUSE DEVICE

A 5.6Ω fusible resistor (R76) is used for low voltage power supply protection. (For location, see tube placement chart.)

CENTERING

Centering is accomplished mechanically by adjusting two magnetic rings around the neck of the picture tube. Rotate the two rings around the neck of the tube until the picture is properly centered.

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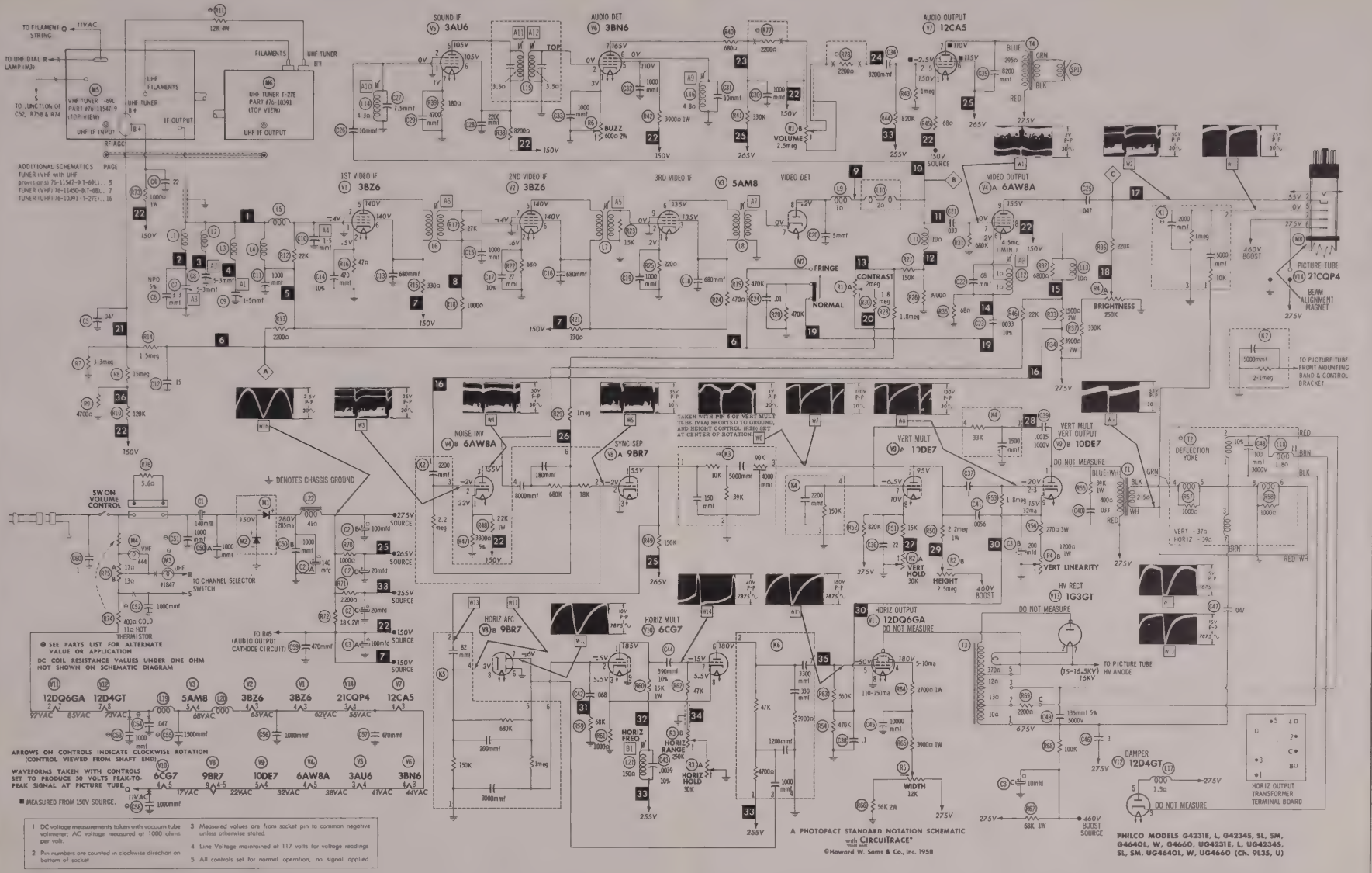
H907

PHILCO MODELS G4231E, L, G4234S, SL, SM, G4640L, W, G4660, UG4231E, L, UG4234S, SL, SM, UG4640L, W, UG4660 (Ch. 9L35, U)

PHILCO MODELS G4231E, L, G4234S, SL, SM, G4640L, W, G4660, UG4231E, L, UG4234S, SL, SM, UG4640L, W, UG4660 (Ch. 9L35, U)

SET 425 FOLDER 2


SOUND IF V5 3AU6
AUDIO DET V6 3BN6
AUDIO OUTPUT V7 12CA5
1ST VIDEO IF V1 3BZ6
2ND VIDEO IF V2 3BZ6
3RD VIDEO IF V3 5AM8
VIDEO DET
VIDEO OUTPUT V4 A 6AW8A
NOISE INV V4 B 6AW8A
SYNC SEP V8 A 9BR7
VERT MULT V9 A 17DE7
VERT MULT VERT OUTPUT V9 B 10DE7
HORIZ AFC V9 B 9BR7
HORIZ MULT V10 6CG7
HORIZ OUTPUT V11 12DQ6GA
HV RECT V13 1G3GT
DAMPER V12 12D4GT
PICTURE TUBE V14 21CQP4
TO FILAMENT STRING
TO UHF DIAL R LAMP (M3)
UHF TUNER T-69L PART #76-11547-9 (TOP VIEW)
UHF TUNER T-27E PART #76-10391 (TOP VIEW)
UHF IF INPUT
UHF IF OUTPUT
RF AGC
ADDITIONAL SCHEMATICS PAGE
TUNER (VHF with UHF provisions) 76-11547-9T(-69L) .. 5
TUNER (VHF) 76-11450-8T(-68L) .. 7
TUNER (UHF) 76-10391 (T-27E) .. 16
SW ON VOLUME CONTROL
TO CHANNEL SELECTOR SWITCH
DENOTES CHASSIS GROUND
TAKEN WITH PIN 6 OF V5 RT. MULT TUBE (V5A) SHORTED TO GROUND, AND HEIGHT CONTROL (R28) SET AT CENTER OF ROTATION
DO NOT MEASURE
TO PICTURE TUBE HV ANODE
(15-16.5KV) 16KV
TO PICTURE TUBE FRONT MOUNTING BAND & CONTROL BRACKET
BEAM ALIGNMENT MAGNET
DEFLECTION YOKE
HORIZ OUTPUT TRANSFORMER TERMINAL BOARD
460V BOOST
275V SOURCE
265V SOURCE
255V SOURCE
150V SOURCE
BRIGHTNESS 250K
CONTRAST 2meg
FRINGE
NORMAL
VERT HOLD 30K
HEIGHT 2.5meg
VERT LINEARITY
HORIZ FREQ
HORIZ RANGE 250K
HORIZ HOLD 30K
WIDTH 12K
VOLUME 2.5meg
SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION
DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM
ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (CONTROL VIEWED FROM SHAFT END)
WAVEFORMS TAKEN WITH CONTROLS SET TO PRODUCE 50 VOLTS PEAK-TO-PEAK SIGNAL AT PICTURE TUBE
MEASURED FROM 150V SOURCE.
1 DC voltage measurements taken with vacuum tube voltmeter; AC voltage measured at 1000 ohms per volt.
2 Pin numbers are counted in clockwise direction on bottom of socket
3. Measured values are from socket pin to common negative unless otherwise stated.
4. Line Voltage maintained at 117 volts for voltage readings
5 All controls set for normal operation, no signal applied

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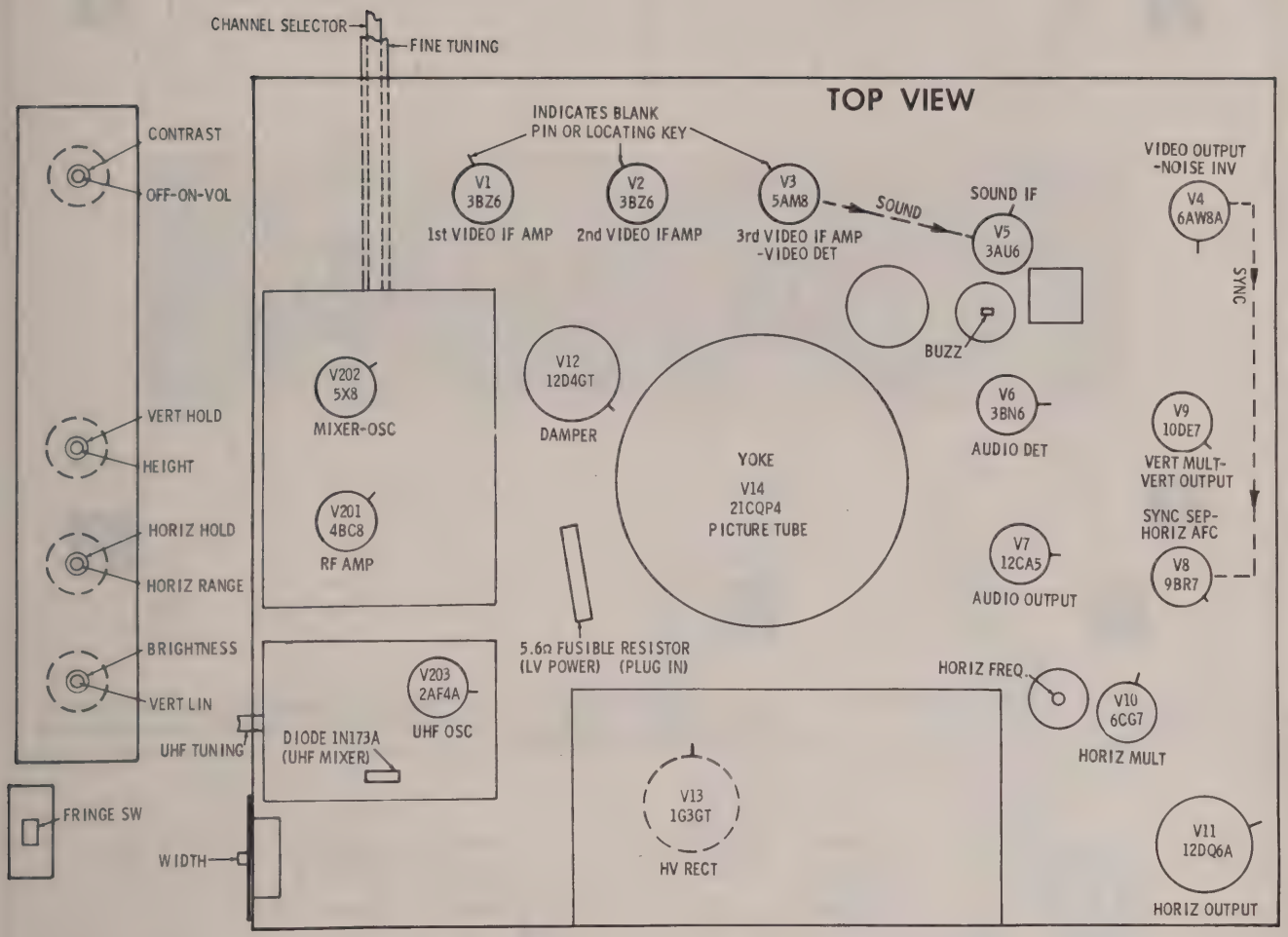
PHILCO MODELS G4231E, L, G4234S, SL, SM, G4640L, W, G4660, UG4231E, L, UG4234S, SL, SM, UG4640L, W, UG4660 (Ch. 9L35, U)

TUBE PLACEMENT CHART



PHILCO MODELS G4231E, L, G4234S, SL, SM, G4640L, W, G4660, UG4231E, L, UG4234S, SL, SM, UG4640L, W, UG4660 (Ch. 9L35, U)

TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce indicated symptoms. Refer to tube placement chart for location and type of tube.

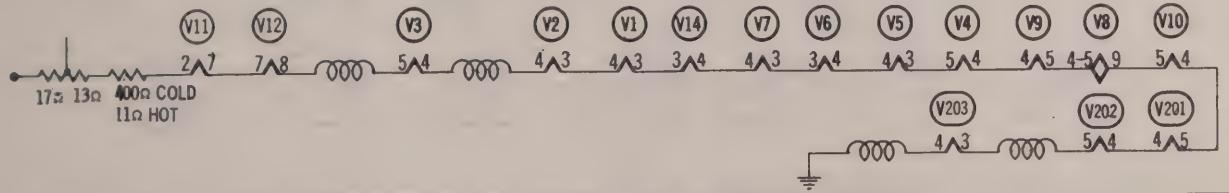
POWER SUPPLY FAILURE
No raster, no sound — Fusible Resistor (5.6Ω), Rectifier (B+)

SWEEP FAILURE
No raster, has sound — V8, V10, V11, V12, V13, V14
No vertical deflection — V9
Poor vert. linearity or foldover — V9
Poor horiz. linearity or foldover — V10, V11, V12
Narrow picture — V10, V11, V12, Rectifier (B+)
Vert. off freq. — V9
Horiz. off freq. — V10

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster — V1, V2, V3
No pic, no sound, has snow — V201, V202, V1 (V203 UHF only)
No pic, has sound, has raster — V4, V14
Has pic, no sound — V5, V6, V7

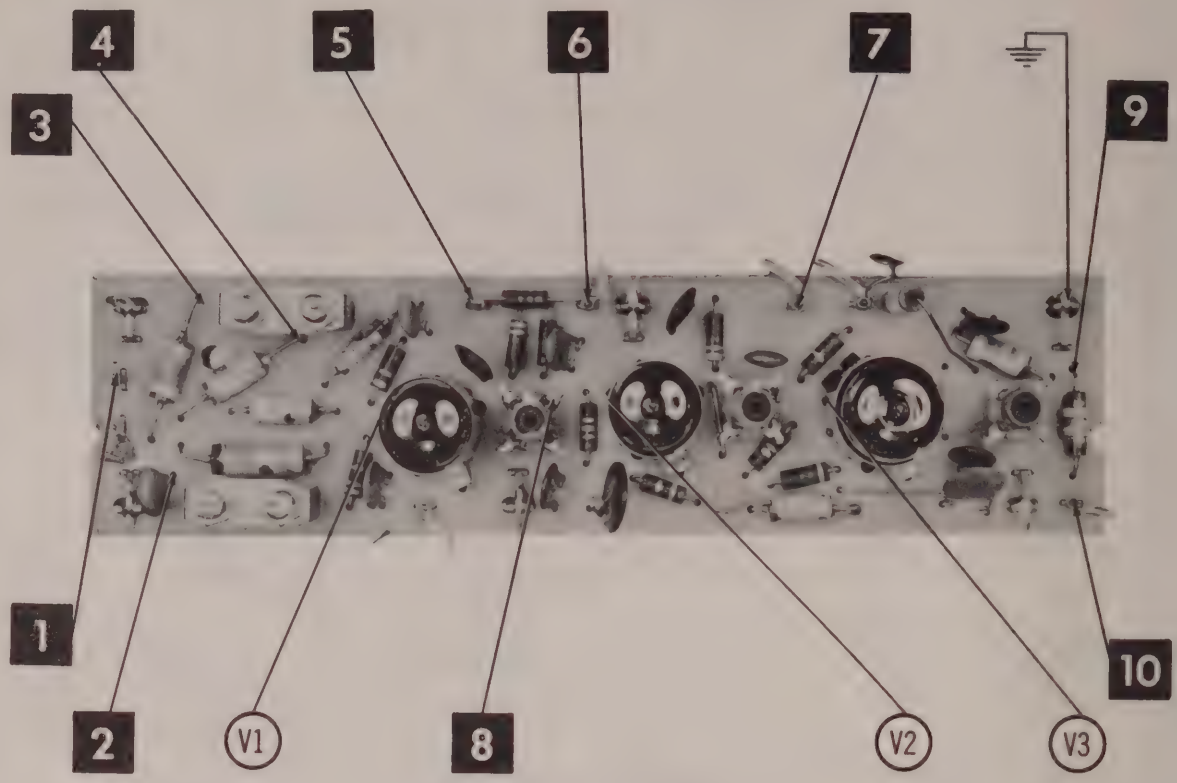
SYNC FAILURE
No vert. sync — V8
No horiz. sync — V8
No vert. or horiz. sync — V8

This receiver employs tubes used in a series filament network, an open filament in any tube will cause the set to be inoperative. (See circuit below.)



FOLDER 2

CircuiTrace Numbers 1 thru 10



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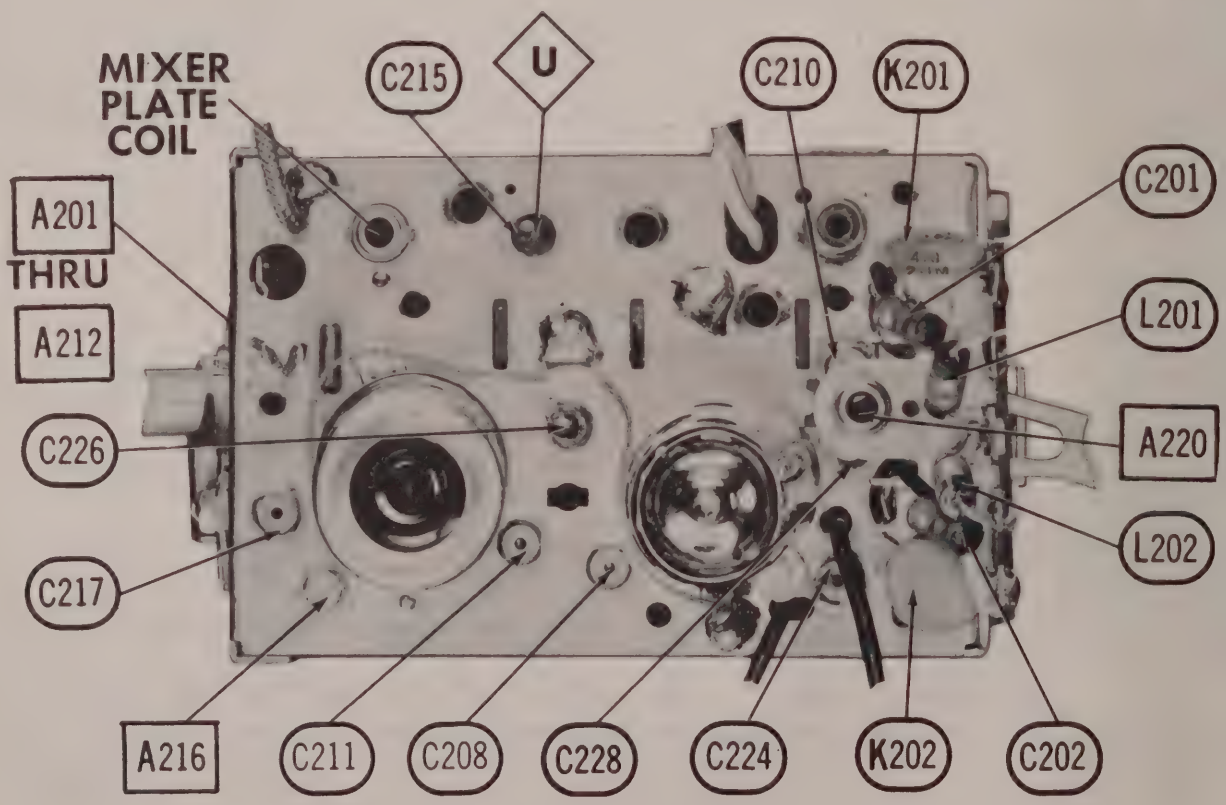
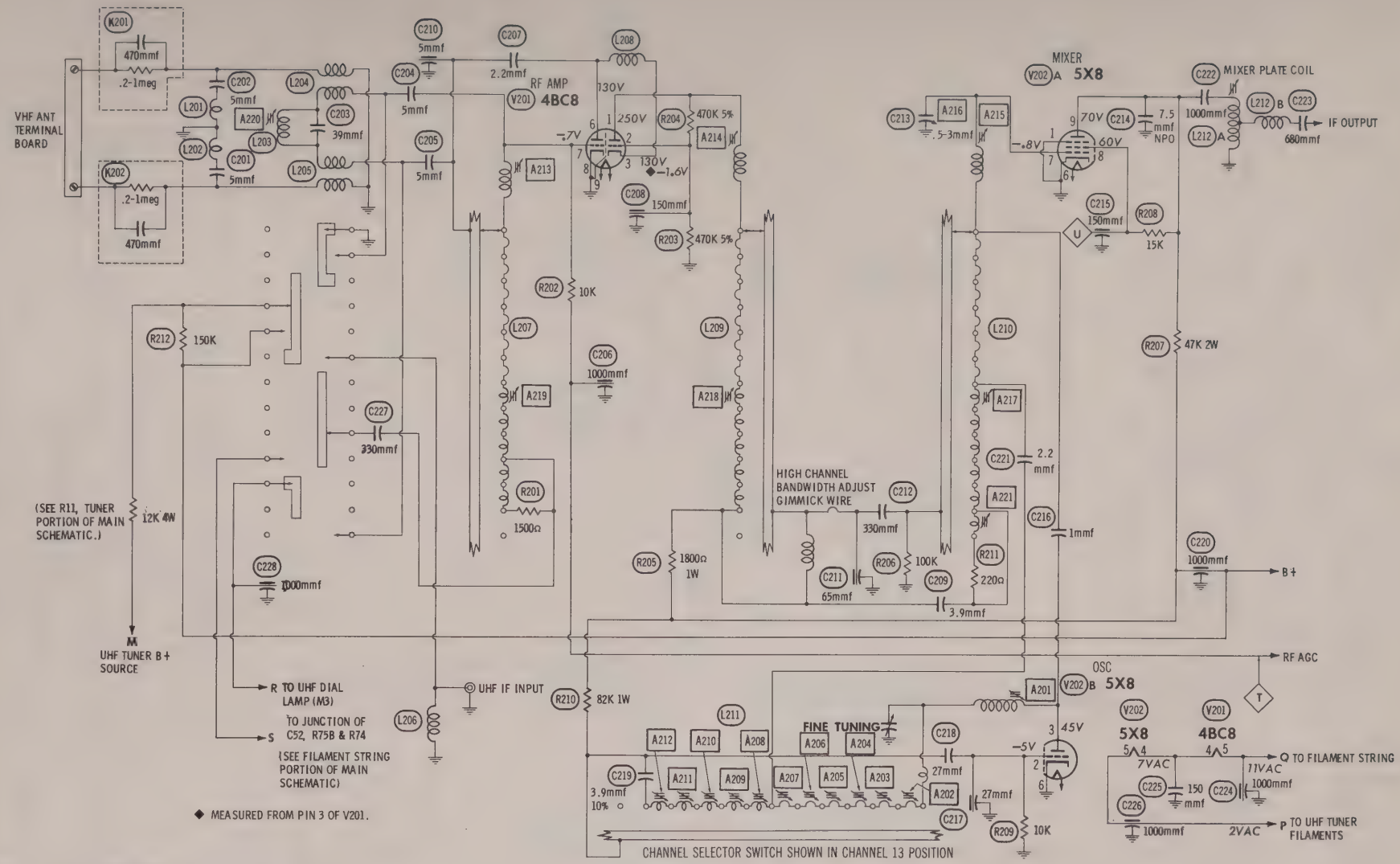
*TRADE MARK

VIDEO IF
PRINTED BOARD

ARROWS INDICATING TUBE LOCATIONS ARE POINTING TO PIN 1 UNLESS OTHERWISE INDICATED



TUNER 76-11547-9 (T-69L) - TOP VIEW



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VHF TUNER WITH UHF PROVISIONS 76-11547-9 (T-69L)

PHILCO MODELS G4231E, L, G4234S, SL, SM, G4640L, W, G4660, UG4231E, L, UG4234S, SL, SM, UG4640L, W, UG4660 (Ch. 9135, U)

TUNER PARTS LIST AND DESCRIPTIONS

76-11547-9

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE	NOTES
V201	RF Amp.	4BC8	
V202	Mixer-Osc.	5X8	

ITEM No.	USE	TYPE	NOTES
V203	UHF Osc.	2AF4A	

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP.	VOLT	PHILCO PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	SPRAGUE PART No.	
C201	5		30-1224-78	SI 5		LT6V5	ZT-555	5GA-V5	
C202	5		30-1224-78	SI 5		LT6V5	ZT-555	5GA-V5	
C203	39		62-03940911	DI-000039	DD-390	L10Q39	UC-5439	5GA-Q39	
C204	5		30-1224-78	SI 5		LT6V5	ZT-555	5GA-V5	
C205	5		30-1224-78	SI 5		LT6V5	ZT-555	5GA-V5	
C206	1000		30-1268-7	EF-001	MFT-1000			503C-D1	
C207	2.2		30-1221-6	NPO-SI 2.2	TCZ-2R2	CTA6V22C		5TCCB-V22	
C208	150		30-1268-6						
C209	3.9		30-1221-14						
C210	5		30-1288-5						
C211	65		30-1268-2						
C212	330		30-1265-2	BPD-00033	DD-331	L10T33	UC-5333	5GA-T33	
C213	.5-3		31-6520-25		829-3		CT565A		
C214	7.5		30-1251-19						NPO
C215	150		30-1268-6						
C216	1.0		30-1224-82						
C217	27		30-1268-4						
C218	27		30-1224-146	SI 27	D6-270	LT6Q27	UC-5427	5GA-Q27	
C219	3.9		30-1221-14						10%
C220	1000		30-1268-7	EF-001	MFT-1000			503C-D1	
C221	2.2		30-1224-143	NPO-SI 2.2	TCZ-2R2	CTA6V22C		5TCCB-V22	
C222	1000		30-1238-13	BPD-001	DD-102	BYA5D1	DC521	5HK-D1	
C223	680		30-1238-22	BPD-00068	DD-681	BYA10T68	UC-5368	5GA-T68	
C224	1000		30-1268-7	EF-001	MFT-1000			503C-D1	
C225	150		30-1265-3	BPD-00015	DD-151	L10T15	UC-5315	5GA-T15	
C226	1000		30-1268-7	EF-001	MFT-1000			503C-D1	
C227	330		30-1265-2	BPD-00033	DD-331	L10T33	UC-5333	5GA-T33	
C228	1000		30-1268-7	EF-001	MFT-1000			503C-D1	
C229	.68		30-1221-11		TCZ-R68				
C230	30		76-10170						
C231	15		30-1224-133						N1500 ±.25mmf
C232	.5-3		31-6520-1		829-3		CT565A		
C233	250		30-1261						
C234	1000		30-1258	EF-001	MFT-1000			503C-D1	
C235	1000		30-1258	EF-001	MFT-1000			503C-D1	

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING		PHILCO PART No.	NOTES
	OHMS	WATT		
R201	1500Ω		66-2158340	
R202	10K		66-3108340	
R203	470K 5%		66-4478240	
R204	470K 5%		66-4478240	
R205	1800Ω	1	66-2184340	
R206	100K		66-4108340	
R207	47K	2	66-3478340	
R208	15K		66-3158340	

ITEM No.	RATING		PHILCO PART No.	NOTES
	OHMS	WATT		
R209	10K		66-3108340	
R210	82K	1	66-3824340	
R211	220Ω		66-1228340	
R212	150K		66-4158340	
R213	470K		66-4478340	
R214	5600Ω		66-2568340	
R215	1500Ω		66-2158340	

COILS (RF-IF)

ITEM No.	USE	PHILCO PART No.	NOTES
L201	RF Choke	32-4645-37	
L202	RF Choke	32-4645-37	
L203	IF Trap	32-4719-2	
L204	VHF Ant. Trans.	32-4725	
L205	VHF Ant. Trans.	32-4725	
L206	RF Choke	32-4726-10	
L207	Ant. Coils	76-10112	Channel 2-13, Includes wafer assy.
L208	Cathode Choke	32-4652-51	
L209	RF Coils	328-0116	Channel 2-13, Includes wafer assy.
L210	Mixer Grid Coils	76-10110	Channel 2-13, Includes wafer assy.

ITEM No.	USE	PHILCO PART No.	NOTES
L211	Osc. Coils	328-0113	Channel 2-13, Includes wafer assy.
L212A B	Mixer Plate Coil RF Choke	32-4629-9	
L213	UHF Ant. Input Assy.	76-10072	Includes C229, R213
L214	Cathode Choke	32-4642-4	
L215	Fil. Choke	32-4642-3	
L216	Fil. Choke	32-4652-44	
L217	RF Choke	76-10170	Includes crystal panel assy.

COMPONENT COMBINATIONS

ITEM No.	USE	DESCRIPTION	PHILCO PART No.	REPLACEMENT DATA	
K201	Antenna Isolation Network	470mmf, .2-1meg	30-6028-1	Centralab Sprague	RC-471 AC1-1
K202	Antenna Isolation Network	470mmf, .2-1meg	30-6028-1	Centralab Sprague	RC-471 AC1-1

CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA			NOTES
		PHILCO PART No.	CBS PART No.	SYLVANIA PART No.	
M201	1N82A	34-8027	1N82A	1N82A	UHF Mixer (Clip-in)

VHF TUNER 76-11450-8 (T-68H)

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TUNER ALIGNMENT INSTRUCTIONS

PRE-ALIGNMENT INSTRUCTIONS

USE AN ISOLATION TRANSFORMER TO PROTECT THE TEST EQUIPMENT.
The high voltage lead should be securely taped and kept away from the chassis.
Allow a 20 minute warm-up period for the receiver and test equipment.
Suggest alignment tools:

A201 thru A212	General Cement #5097 or 8727 Walsco
A213 thru A215	General Cement #9291 Walsco #2520, 2522
A216	General Cement #5000, 5003, 5004, 5008, 5009, 8276 or 9291 Walsco #2515, 2520, 2522, 2525 or 2537
A217, A218, A221	General Cement #5000, 5003, 8276, 8290 or 8609 Walsco #2525
A219	General Cement #8606, 8606L or 9091 Walsco #2542, 2543 or 2544
A220	General Cement #8282, 8606, 8606L or 9295 Walsco #2543, 2544, 2545

VHF OSCILLATOR ALIGNMENT

The signal generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Set the Fine Tuning to the center of its range.
Use only enough signal generator output to provide a usable indication on scope.
This procedure uses the traps of the Video IF strip. They must be in proper alignment before attempting to align the oscillator.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	Two 120Ω Carbon Resistors	Across VHF antenna terminals with 120Ω in each lead.	209.75MC (400∿ 50% AM Mod)	13	Across Video Detector load.	A201	Adjust for MINIMUM 400∿ indication.
			203.75MC	12		A202	
			197.75MC	11		A203	
			191.75MC	10		A204	
			185.75MC	9		A205	
			179.75MC	8		A206	
			173.75MC	7		A207	
			81.75MC	6		A208	
			75.75MC	5		A209	
			65.75MC	4		A210	
			59.75MC	3		A211	
			53.75MC	2		A212	

VHF RF AND MIXER ALIGNMENT

Connect the negative lead of a 1.5 volt bias supply to point ⓣ. Positive to chassis.
Detune Mixer Plate Coil by connecting a 10 to 20mmf capacitor across it temporarily.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
Use only enough sweep generator output to provide a usable pattern on scope.
Use 10MC sweep unless otherwise noted.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
2.	Two 120Ω Carbon Resistors	Across VHF antenna terminals with 120Ω in each lead.	213MC	211.25MC 215.75MC	13	Vert. Amp. thru 10K to point ⓤ. Low side to chassis.	A213	Adjust for maximum gain and symmetry of response similar to Fig. 201 with markers as shown.
3.	"	"	"	"	"	"	A214, A215	Adjust for maximum gain and symmetry of response similar to Fig. 201 with markers as shown. Adjust A214 to set marker positions, A215 for proper tilt.
4.	"	"	177MC	175.25MC	7	"	A216	Adjust to obtain correct tilt on top of curve as in Fig. 202 to compensate for the tuning effect of channel 13.
5.	"	"	213MC	213MC	13	"		Retouch A214 and A215 SLIGHTLY for symmetrical response centered about marker. Repeat steps 4 and 5 alternately until optimum response is obtained on channels 7 and 13.
6.	"	"	85MC	85MC	6	"	A217, A218, A219	Turn A217 counterclockwise until a single peak appears. (DO NOT unscrew far enough to allow the core to fall out.) Adjust A218 until peak falls at 85MC. (It may be necessary to increase sweep generator output.) Adjust A219 for maximum amplitude and symmetry of single peak.
7.	"	"	85MC	83.25MC 87.75MC	"	"		Retouch A217 and A218 for response similar to Fig. 203.
8.	"	"	Not used	43.5MC (400∿ 30% AM Mod)	4	"	A220	Adjust for MINIMUM scope indication.

CONTINUED PAGE 13

ALIGNMENT INSTRUCTIONS

PRE-ALIGNMENT INSTRUCTIONS

USE AN ISOLATION TRANSFORMER TO PROTECT THE TEST EQUIPMENT.
The High Voltage lead should be securely taped and kept away from the chassis.
Allow a 20 minute warm-up period for the receiver and test equipment.
Suggested alignment tools: A1 thru A4 ..... General Cement #8607, 9291 or 9294
Walsco #2520, 2522, 2523 or 2537
A5 thru A12, ... General Cement #8282, 8606, 8606L or 9295
Walsco #2543, 2544 or 2545

VIDEO IF ALIGNMENT

Connect the negative lead of a 4.5 volt bias supply to point (A). Positive to chassis.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Use only enough sweep generator output to provide a usable pattern on scope.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	Direct	High side to ungrounded tube shield floating over Mixer-Osc. tube (V202). Low side to chassis.	Not used.	47.4MC (400∿ 30% AM Mod)	4	Vert. Amp. thru 10K to point (B). Low side to chassis. (Across video detector load).	Mixer Plate Coil	Adjust for maximum deflection.
2.	"	"	"	41.25MC (Crystal Accuracy)	"	"	A1	Increase generator output. Adjust for MINIMUM 400∿ indication.
3.	"	"	"	47.4MC (Crystal Accuracy)	"	"	A2, A3	Increase generator output. Adjust for MINIMUM 400∿ indication. Repeat steps 2 and 3.
4.	"	"	"	45.0MC	"	"	Mixer Plate Coil	Adjust for maximum 400∿ indication on scope.
5.	"	"	"	42.7MC	"	"	A4, A5	"
6.	"	"	"	45.75MC	"	"	A6	"
7.	"	"	"	43.85MC	"	"	A7	"
8.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	"	65.75MC	"	"	Fine Tuning	Adjust Fine Tuning for MINIMUM 400∿ indication on scope. DO NOT change Fine Tuning during balance of alignment.
9.	"	"	69MC (10MC Swp)	42.7MC 43.85MC 45.0MC 45.75MC	"	"		Check for response similar to Fig. 1. If necessary, retouch Mixer Plate Coil to set carrier level, A7 to adjust curve limit, A5 and A4 to adjust low frequency slope of curve and A6 to adjust high frequency side.

4.5MC TRAP ALIGNMENT

The detector used in alignment of the 4.5MC trap must first be padded by connecting to an accurate source of 4.5MC and a VTVM to the output.
Adjust the slug for maximum deflection.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
10.	.005mfd	High side to point (B). Low side to chassis.	4.5MC (400∿ 30% AM Mod)	Any non-interfering channel	DC probe thru detector probe (Fig. 2) to cathode of picture tube (point (C)). Common to chassis.	A8	Adjust for MINIMUM deflection.

SOUND IF ALIGNMENT

Tune in a weak station signal (antenna disconnected) and adjust for best picture. Do not change setting of Fine Tuning during balance of alignment.
Connect the antenna for a strong signal. Adjust A9 for maximum sound. Use peak furthest counterclockwise.
Disconnect antenna. Adjust A10, A11 and A12 for maximum sound.
Connect antenna. Retouch A9 for maximum sound.

TUNER ALIGNMENT INSTRUCTIONS LOCATED ON PAGES 8 & 13

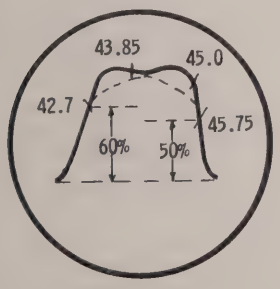


FIG.1

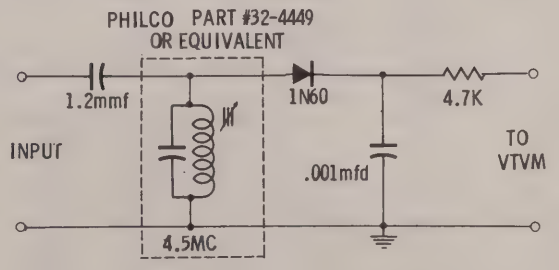


FIG.2

PARTS LIST AND DESCRIPTIONS

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No	USE	TYPE	NOTES
V1	1st Video IF Amp.	3BZ6	
V2	2nd Video IF Amp.	3BZ6	
V3	3rd Video IF Amp.- Video Det.	5AM8	
V4	Video Output-Noise Inv.	6AW8A	
V5	Sound IF	3AU6	
V6	Audio Det.	3BN6	

ITEM No	USE	TYPE	NOTES
V7	Audio Output	12CA5	
V8	Sync Sep.-Horiz. AFC	9BR7	
V9	Vert. Mult.-Vert. Output	10DR7	
V10	Horiz. Mult.	6CG7	
V11	Horiz. Output	12DQ6A	
V12	Damper	12DG7	
V13	HV Rectifier	1G3GT	

PICTURE TUBE

ITEM No	REPLACEMENT DATA: PHILCO PART No.	GENERAL ELECTRIC PART No.	RCA PART No.	SYLVANIA PART No.	NOTES
V14	21CQP4			21CQP4 ①	① "Silver Screen 85"

ELECTROLYTIC CAPACITORS

ITEM No	RATING: CAP.	RATING: VOLT	PHILCO PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No	PYRAMID PART No	SANGAMO PART No	SPRAGUE PART No.
C1	140	150	30-2568-70	AFH3I-23	XA0261	FP117	TMS-24	Q-011 MT-4580	TVL-1528 TVL3-4588 *
C2A	▲140	300	30-2590-27	AFH34-02-70					
B	▲100	300							
C	▲20	300							
D	20	300							
C3A	▲100	200	30-2590-37	AFH3-177-50					TVL3-3708.2*
B	200	25							
C	▲10	450							

* Not normally in distributors stock. Available through distributor on order to manufacturer.

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	PHILCO PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C4	.22	200	30-4678-48	P288N-22		CUB2P22	GEM-2022	2TM-P22	
C5	.047	400	30-4650-45	P488N-047	DF-503	CUB4S47	GEM-4147	4TM-S47	
C6	3.3		30-1263-38		DTZ-3R3	C10Y3S	CNO-533	5TCCB-V33S 5%*	
C7	.5-3		31-6555-1		829-3		CT565A		
C8	.5-3		31-6535-1		829-3		CT565A		
C9	1-5		31-6535-2						
C10	1-5		31-6535-2						
C11	1000		30-1262-11	BPD-001	DD-102	BYA5DI	B-210	5HK-DI	
C12	.15	200	30-4650-48	P288N-15		CUB2P15	GEM-2015	2TM-P15	
C13	680		30-1262-15	DI-680	DD-681	L10T68	B-368	5GA-T68	
C14	470		30-1262-18	DI-470	MD-471	L10T47	JL-347	5GA-T47 S 10% *	10%
C15	1000		30-1262-11	BPD-001	DD-102	BYA5DI	B-210	5HK-DI	
C16	680		30-1262-15	DI-680	DD-681	L10T68	B-368	5GA-T68	
C17	27		30-1263-6	DI-27	DD-270	L10Q27	CNO-427	5GA-Q27 S 10% *	10%
C18	680		30-1262-15	DI-680	DD-681	L10T68	B-368	5GA-T68	
C19	1000		30-1262-11	BPD-001	DD-102	BYA5DI	B-210	5HK-DI	
C20	5		30-1263	DI-5	DD-050	L10Q5	CNO-547	5GA-Y5	
C21	.033	200	30-4650-44	P288N-033	DF-303	CUB6S33	GEM-4133	6TM-S33	
C22	68		30-1263-4	DI-68	DD-680	L10Q68	CNO-468	5GA-Q68	
C23	.0033	600	30-4651-34				GEM-16233	6TM-D33 S 10% *	
C24	.01	600	30-4650-58	P688N-01	D6-103	CUB6SI	GEM-611	6TM-SI	
C25	.047	400	30-4650-45	P488N-047	DF-503	CUB4S47	GEM-4147	4TM-S47	
C26	10		30-1221-25	SE 10	DE-100	LT6Q	UC-641	5GA-Q	
C27	7.5		30-1263-37		DD-7R5			5GA-V75	
C28	2200		30-1262-7	BPD-0022	DD-222	BYA10D22	B-222	5HK-D22	
C29	4700		30-1262-2	BPD-0047	DD-472	BYA10D47M	B-347	5HK-D47	
C30	1000		30-1262-13	BPD-001	DD-102	BYA5DI	B-210	5HK-DI	
C31	10		30-1263-36	DI-10	DD-100	L10Q1	CNO-410	5GA-Q1	
C32	1000		30-1262-13	BPD-001	DD-102	BYA5DI	B-210	5HK-DI	
C33	1000		30-1262-13	BPD-001	DD-102	BYA5DI	B-210	5HK-DI	
C34	8200		30-1262-1				B-282		
C35	8200		30-1262-1				B-282		
C36	.22	[illegible]	30-4650-49	P288N-22		CUB2P22	GEM-2022	2TM-P22	
C37	1	[illegible]	30-4685-47	P488N-1	DF-104	CUB4P1	GEM-401	4TM-P1	
C38	.1	[illegible]	30-4650-47	P288N-1	DF-104	CUB2P1	GEM-201	2TM-P1	
C39	.0015	[illegible]	30-4650-67	P1088N-0015	DD-152	BYA10D15	GEM- 10315	10TM-D15	
C40	.033	[illegible]	30-4650-44	P488N-033	DF-303	CUB4S33	GEM-4133	4TM-S33	
C41	.0056	[illegible]	30-4651-11		D6-562		GEM-6156		
C42	.068	200	30-4694-29	P288N-068		CUB4S68	GEM-4168	4TM-S68	
C43	.0039	400	30-4651-25					5BF-D39	10%
C44	390		30-1264-1	1469-00039	MD-391	SR5T39		MB-339	10%
C45	10000		30-1236-2	BPD-01	DD-103	BYA10S1	B-110	5HK-S1	
C46	.1	[illegible]	30-4650-47	P488N-1	DF-104	CUB4P1	GEM-401	4TM-P1	
C47	.047	[illegible]	30-4650-45	P488N-047	DF-503	CUB4S47	GEM-4147	4TM-S47	
C48	100	[illegible]	30-1246-14						10%
C49	135	5000	30-1246-17						5%
C50A	1000		30-1239-3	BPD-2X001	DD3-102	BYC5DDI	B-210	5HK-2DI	
B	1000						B-210		
C51	1000		30-1238-3	BPD-001	DD-102	BYA5DI	B-210	5HK-DI	①
C52	1000		30-1238-3	BPD-001	DD-102	BYA5DI	B-210	5HK-DI	①
C53	1000			BPD-001	DD-102	BYA5DI	B-210	5HK-DI	③④
C54	.047	400		P488N-047	DF-508	CUB4S47	GEM-4147	4TM-S47	③
C55	1500			BPD-0015	DD-152	BYA10D15	B-215	5HK-D15	③
C56	1000		30-1262-11	BPD-001	DD-102	BYA5DI	B-210	5HK-DI	
C57	470		30-1262-18	DI-470	DD-471	L10T47	B-347	5GA-T47	
C58	1000		30-1238-3	BPD-001	DD-102	BYA5DI	B-210	5HK-DI	①
C59	470		30-1238-10	DI-470	DD-471	L10T47	B-347	5GA-T47	
C60	.1	600	30-4650-64	P688N-1	DF-104	CUB6P1	GEM-601	6TM-P1	

① Used in Ch. 9L35U only.
② Not used in some versions.
③ Some versions may use 1000mmf in this application (Part #30-1262-11).
* Not normally in distributors stock. Available through distributor on order to manufacturer.

CONTROLS

ITEM No	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: PHILCO PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	2meg		33-5592-15		RTV-560	◆ QJ-1090	◆◆ UE3825S	Contrast
B	2.5meg				Not Req.			Volume
C	Switch				Not Req			
R2A	30K		33-5592-30	F1-37		▼† QJ-980	†† UE3902	Vert. Hold
B	2.5meg			R3-76				Height
R3A	30K		33-5592-31	F1-38		▲▲ QJ-979	▲▲ UE3901	Horiz. Hold
B	250K			R3-34				Horiz. Range
R4A	250K		33-5593-36			▲▲ QJ-978	▲▲ UE3900	Brightness
B	1200Ω							Vert. Lin.
R5A	12K		33-5574-3	WN-153		Wil-317		Width
B	Shaft			Not Req.		SK5		
R6	600Ω	2(WW)	33-5591-6					Buzz

◆ "Concentrikit" Equivalent: K-15 Kit, Base Elements & Shafts B17-139, P17-034 (Panel) B13-140, R1-105 (Rear) 76-1 (Switch)

◆◆ "STA-LOC" Equivalent: FB26R, O8750, RU255A, IS1250, U84I.

■ Not available as a factory assembled unit.

† "Concentrikit" Equivalent: K-6 Kit, Base Elements & Shafts B11-121, P3-111 (Panel) B11-139, R15-005 (Rear)

†† "STA-LOC" Equivalent: FA34L, O8312, RU255L, I3875.

▲ "Concentrikit" Equivalent: K-6 Kit, Base Elements & Shafts B11-121, P3-111 (Panel) B11-130, R15-005 (Rear)

▲▲ "STA-LOC" Equivalent: FA34L, O8312, RU254L, I3875.

● "Concentrikit" Equivalent: K-6 Kit, Base elements & Shafts B11-130, P3-111 (Panel) B11-108, R15-005 (Rear)

●● "STA-LOC" Equivalent: FA254L, O8312, RU13L, I3875.

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING: OHMS	RATING: WATT	PHILCO PART No.	NOTES
R7	3.3meg		66-5333340	
R8	15meg		66-5153340	
R9	4700Ω		66-3473340	
R10	130K		66-4123340	
R11	12K	4	33-1363-11	Note 1
R12	22K		66-3223340	
R13	2200Ω		66-2223340	
R14	1.5meg		66-5153340	
R15	330Ω		66-1333340	
R16	47Ω		66-0473340	
R17	27K		66-3273340	
R18	1000Ω		66-2103340	
R19	470K		66-4473340	
R20	470K		66-4473340	
R21	330Ω		66-1333340	
R22	220Ω		66-0683340	
R23	15K		66-3153340	
R24	470Ω		66-1473340	
R25	220Ω		66-1223340	
R26	3900Ω		66-2393340	
R27	150K		66-4153340	
R28	1.8meg		66-5183340	
R29	1meg		66-5103340	
R30	1.5meg		66-5153340	
R31	680K		66-4683340	
R32	6800Ω		66-2683340	
R33	1500Ω	2	66-2153340	
R34	3900Ω	7	33-1363-24	
R35	68Ω		66-0683340	
R36	220K		66-4223340	
R37	330K		66-4333340	
R38	2200Ω		66-2223340	
R39	180Ω		66-1183340	
R40	680Ω		66-1683340	
R41	330K		66-4333340	
R42	3900Ω	1	66-2394340	
R43	1meg		66-5103340	

Note 1. Not used in Ch. 9L35.

ITEM No.	RATING: OHMS	RATING: WATT	PHILCO PART No.	NOTES
R44	820K		66-4823340	
R45	68Ω		66-0683340	
R46	22K		66-3223340	
R47	3300Ω 5%		66-2338240	
R48	32K	1	66-3324340	
R49	150K		66-4153340	
R50	2.2meg	1	66-5224340	
R51	15K		66-3153340	
R53	820K		66-4823340	
R53	1.8meg		66-5183340	
R54	470K		66-4473340	
R55	33K	1	66-3334340	
R56	270Ω	3	33-1363-19	
R57	1000Ω		66-2103340	
R58	1000Ω		66-2103340	
R59	68K		66-3683340	
R60	15K	1	66-3154340	
R61	1000Ω		66-2103340	
R62	47K		66-3473340	
R63	560K		66-4563340	
R64	2700Ω	1	66-2274340	
R65	2900Ω	1	66-2394340	
R66	56K	2	66-3565340	
R67	68K	1	66-3684340	
R68	100K		66-4103340	
R69	2200Ω		66-2223340	
R70	1000Ω		66-2103340	
R71	2200Ω		66-2223340	
R72	18K	3	66-3185340	
R73	1000Ω	1	66-2104340	
R74	400Gcold 110 hot		33-1343-11	
R76A	17Ω		33-1368-11	
B	13Ω			
R76	9.5Ω		33-1368-3	
R77	2200Ω		66-2228340	Note 2
R78	2200Ω		66-2228340	Note 2

Note 2. Not used in some versions.

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA: PHILCO PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No.	NOTES
L1	47.4MC Trap Coil	32-4645-32	19-1001	BC-562	4604		1.5 Microhenries
L2	47.4MC Trap Coil	32-4645-19	19-1002	BC-563	4606		2.8 Microhenries
L3	41.25MC Trap Coil	32-4645-17					3 Microhenries
L4	RF Choke	32-4645-30			4504		.33 Microhenry
L5	1st Video IF Coil	32-4646-35	19-3001	TV-189	6175	VP-9	
L6	2nd Video IF Coil	32-4686-2					
L7	3rd Video IF Coil	32-4686-2					
L8	4th Video IF Coil	32-4686-3					
L9	Resonant Choke	32-4645-7					3 Microhenries
L10	Resonant Choke	32-4674-1					22 Microhenries
L11	Shunt Peaking Coil	32-4762-8	19-4301	TV-197	6154		220 Microhenries
L12	4.5MC Trap	32-4644-15					
L13	Shunt Peaking Coil	32-4762-8	19-4301	TV-197	6154		220 Microhenries
L14	1st Sound IF	32-4644-12					
L15	2nd Sound IF	32-4745-2					
L16	Quadrature Coil	32-4644-13					
L17	RF Choke	32-4112-50	19-1005	BC-566	4623		11 Microhenries
L18	RF Choke	32-4112-43 †	19-3001	TV-189	6175	VP-9	.61 Microhenry
L19	Fil. Choke	32-4645-35					
L20	Fil. Choke	32-4645-18					3.1 Microhenries

† Part of T2.

TRANSFORMER (HORIZ. OSC.)

ITEM No.	DC RES.: PRI.	DC RES.: SEC.	REPLACEMENT DATA: PHILCO PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No.	Thordarson PART No.	NOTES
L21	150Ω		32-4754-3						Horiz. Freq.

FILTER CHOKE

ITEM No.	RATINGS: CURRENT (Measured)	RATINGS: DC RES.	RATINGS: INDUCTANCE @ CURRENT	REPLACEMENT DATA: PHILCO PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
L22	285A	41Ω	1.3 Hy @ 300 MA	32-8710-4					26C44	C-23X

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No.	USE	REPLACEMENT DATA: PHILCO PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Rogers PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	Vert. Output	32-8829-3	Z1900 ①	A-2823			A-8142 ②	26S72	A-108X
T2	Yoke-Horiz.(30MH) (110°)-Vert. (37MH)	76-10282-5 ③						Y-52 ④	
	Alt. Yoke	76-10282-4							
	Rear Cover & Centering Device	76-10304-1							
	Yoke Clamp	28-12126-1							
T3	Horiz. Output	32-8830-3							

① Use 8 : 1 turns ratio.
② Drill new mounting hole(s).
③ Includes damper choke (L18).
④ Remove 27mmf capacitor across yoke terminals #2 and #7. Use original damping network, and rear cover and centering device. Connect same as original.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE: PRI.	IMPEDANCE: SEC.	REPLACEMENT DATA: PHILCO PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T4	5200Ω	3-4Ω	32-8747-2	Z1000 ①	A-3026	AU-601 ①	A-3877 ①	24S51 ①	S-6X	① Drill new mounting hole.

SPEAKER

ITEM No.	TYPE: SIZE	TYPE: FIELD	TYPE: V. C. IMP.	REPLACEMENT DATA: PHILCO PART No	QUAM PART No	NOTES
SP1	4" x 6"	PM	3-4Ω	36-1675-4	46AI	

PHILCO MODELS G4231E, L, G4234S, SL, SM, G4640L, W, G4660, U G4231E, L, U G4234S, SL, SM, U G4640L, W, U G4660 (Ch. 9L35, U)

COMPONENT COMBINATIONS

ITEM No.	USE	DESCRIPTION	PHILCO PART No	REPLACEMENT DATA	
K1	Blanking Network	2000mmf, 5000mmf, 10K, 1meg	30-6519-2 ①	Centralab	PC-336
K2	Sync Coupling	180mmf, 2200mmf, 8000mmf, 18K, 680K, 2.2meg	30-6519-2		
K3	Vert. Integrator	150mmf, 4000mmf, 5000mmf, 10K, 90K, 39K	30-6030-6 ②	Sprague	VS-20
K4	Vert. Coupling	1500mmf, 2200mmf, 33K, 150K	30-6509-2		
K5	Horizontal AFC	82mmf, 200mmf, 3300mmf, 150K, 680K, 1meg	30-6034-1	Sprague	CS-5
K6	Horiz. Mult. Circuit	330mmf, 1200mmf, 1000mmf, 3000mmf, 3900Ω,4700Ω, 47K	30-6513-6	Sprague	HNS-4
K7	Control Bracket Isolation	5000mmf, .2-1meg	30-6028-2		

① Alternate Part #30-6024-1.
② Alternate Part #30-6030-6.

RECTIFIERS

ITEM No.	RATING: CURRENT (Measured)	REPLACEMENT DATA: PHILCO PART No.	FEDERAL PART No.	GENERAL ELECTRIC PART No.	INTERNATIONAL PART No.	SARKES TARZIAN PART No.	NOTES
M1	.285A	34-8047-2 ①		1N1008 ①	SD-500 ②	40K ②	① Germanium Type.
M2	285A	34-8047-2 ①		1N1008 ①	SD-500 ②	40K ②	② Silicon Type.

MISCELLANEOUS

ITEM No.	PART NAME	PHILCO PART No.	NOTES
M3	Lamp	34-2031-4	#1847, Ch. 9L35U only.
M4	Lamp	34-2064	#44
M5	Tuner	76-11547-9	VHF with UHF provisions (T-69L) Ch. 9L35U
	Tuner	76-11450-8	VHF (T-68H) Ch. 9L35
M6	Tuner	76-10391	UHF (T-27E) Ch. 9L35U
M7	Switch	42-2075-5	Fringe-Normal (DPST, Slide Type)
	Magnet	76-10531-1	Beam Alignment
	Printed Board	54-8529-1	Video IF
	Printed Board	54-8724	Video, Vert., Horiz. Osc.

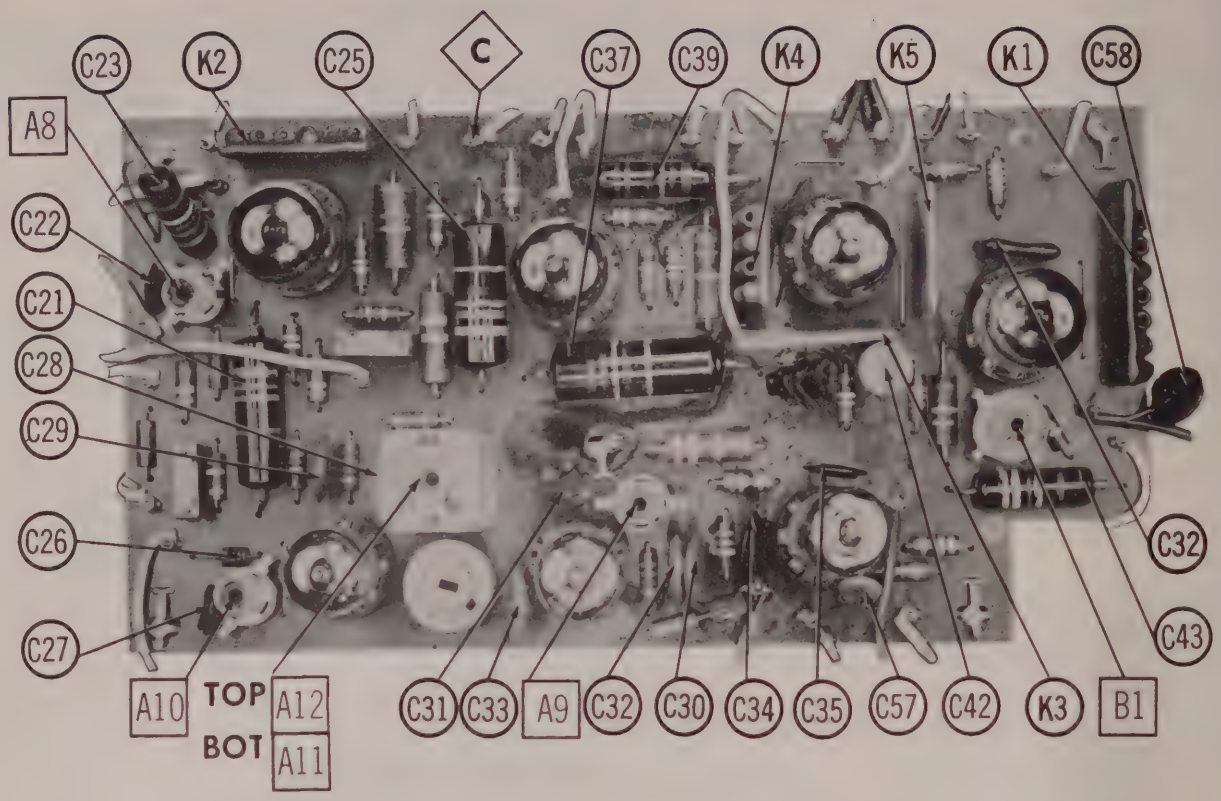
CABINETS & CABINET PARTS

(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

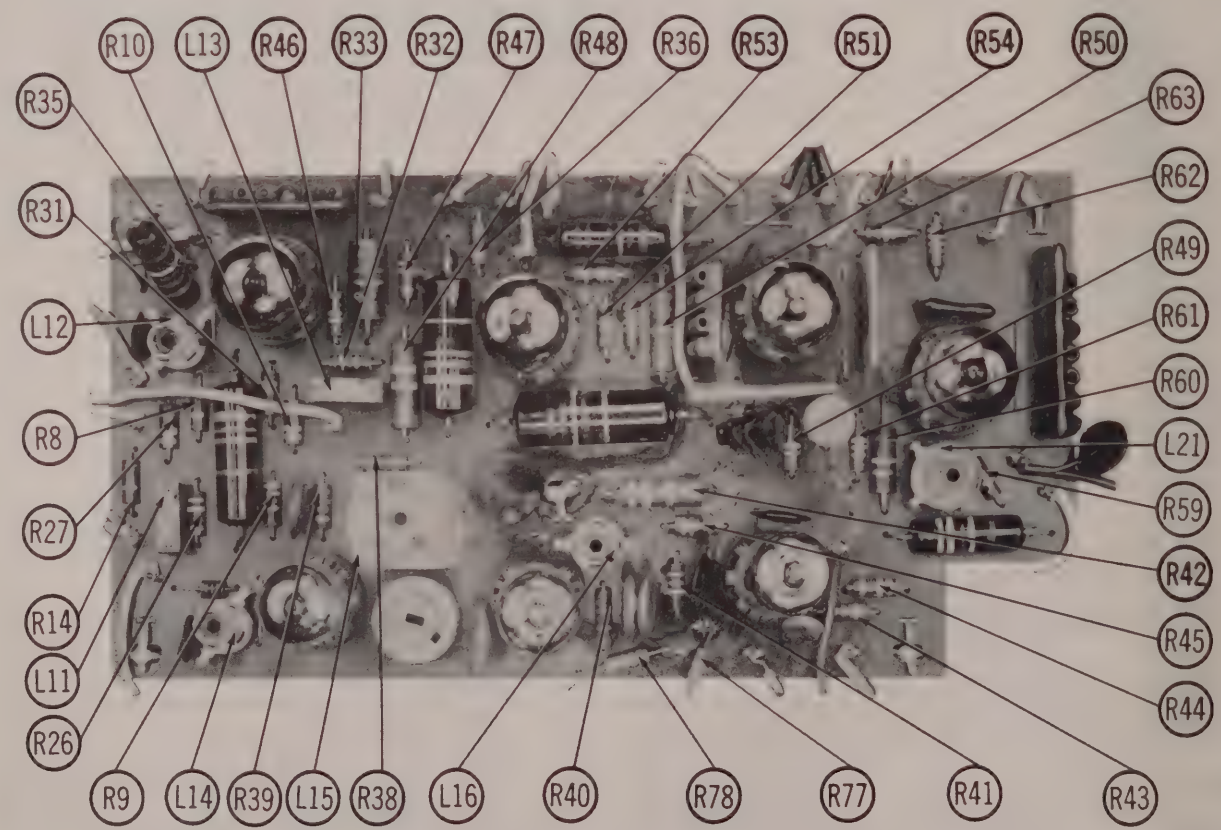
WIRING DATA

High Voltage Lead	Use BELDEN No. 8869
Shielded Hook-up Wire	Use BELDEN No. 8885 (Single Conductor) 8738 (Two Conductor)
General-use Unshielded Hook-up Wire	Use BELDEN No. 8530 (Solid) Available in Ten Colors 8524 (Stranded) Available in Ten Colors
Power Cord (Interlock Type)	Use BELDEN No. 8874
300Ω Tuner Input Lead	Use BELDEN No. 8225
300Ω Antenna Lead-in	Use BELDEN No. 8230 or 8275
Antenna Rotor Cable	Use BELDEN No. 8464 (Flat) or 8484 (Round) - 4 Conductor 8485 (Round) - 5 Conductor 8488 (Round) - 8 Conductor

FOLDER 2



VIDEO, SOUND, SWEEP PRINTED BOARD - CAPACITOR & ALIGN IDENT



VIDEO, SOUND, SWEEP PRINTED BOARD - RESISTOR, INDUCTOR IDENT

TUNER ALIGNMENT INSTRUCTIONS (cont)

UHF IF ALIGNMENT

Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Use only enough sweep generator output to provide a usable pattern on scope.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
9.	1500mmf Ceramic Capacitor	High side to point ⓥ. Low side to chassis.	Not used	43.5MC (400∿ 30% AM Mod)	UHF	Vert. Amp. thru 10K to point ⓤ. Low side to chassis.	A22I	Adjust for flat symmetrical response.

UHF TUNER ALIGNMENT

This portion of the receiver has been properly aligned at the factory and is very stable. Alignment of this portion should not be required in the field.

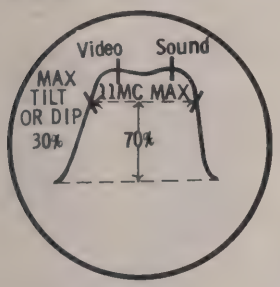
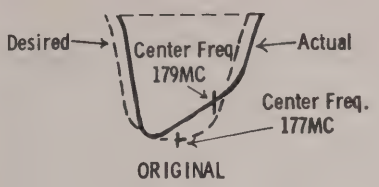
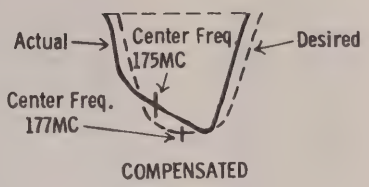


FIG.201



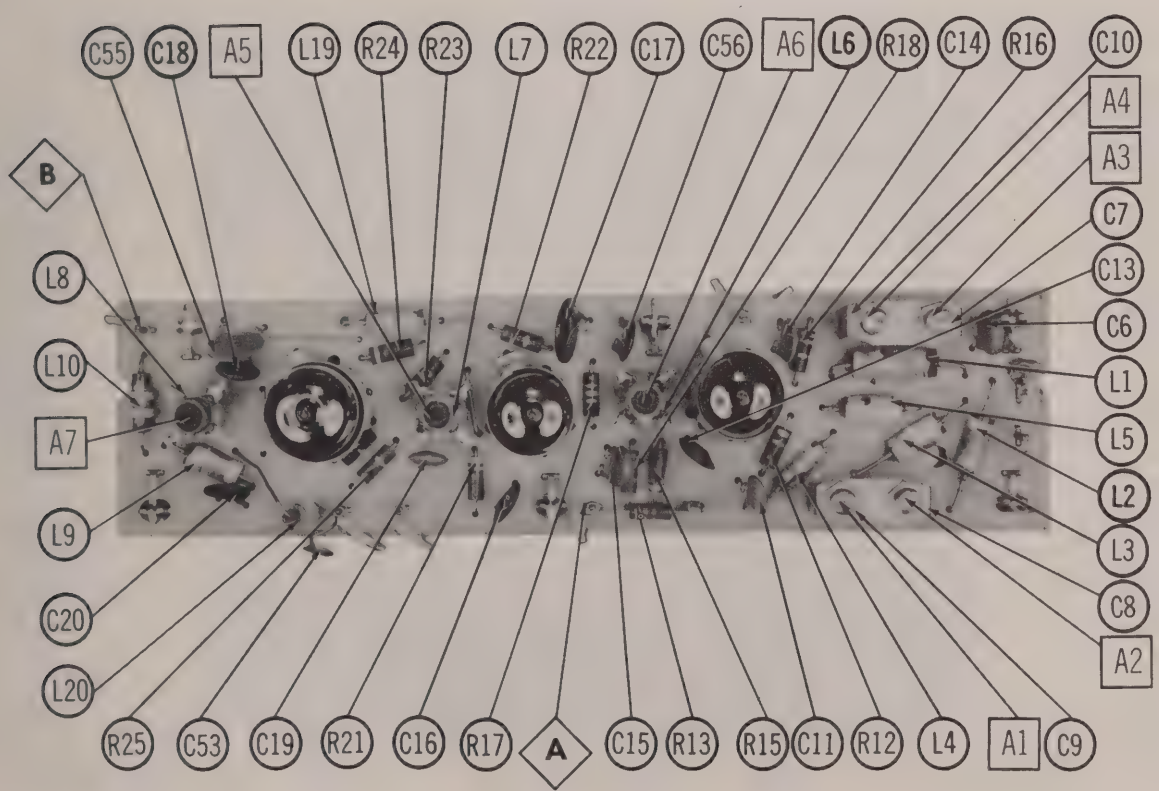
ORIGINAL



COMPENSATED

FIG.202

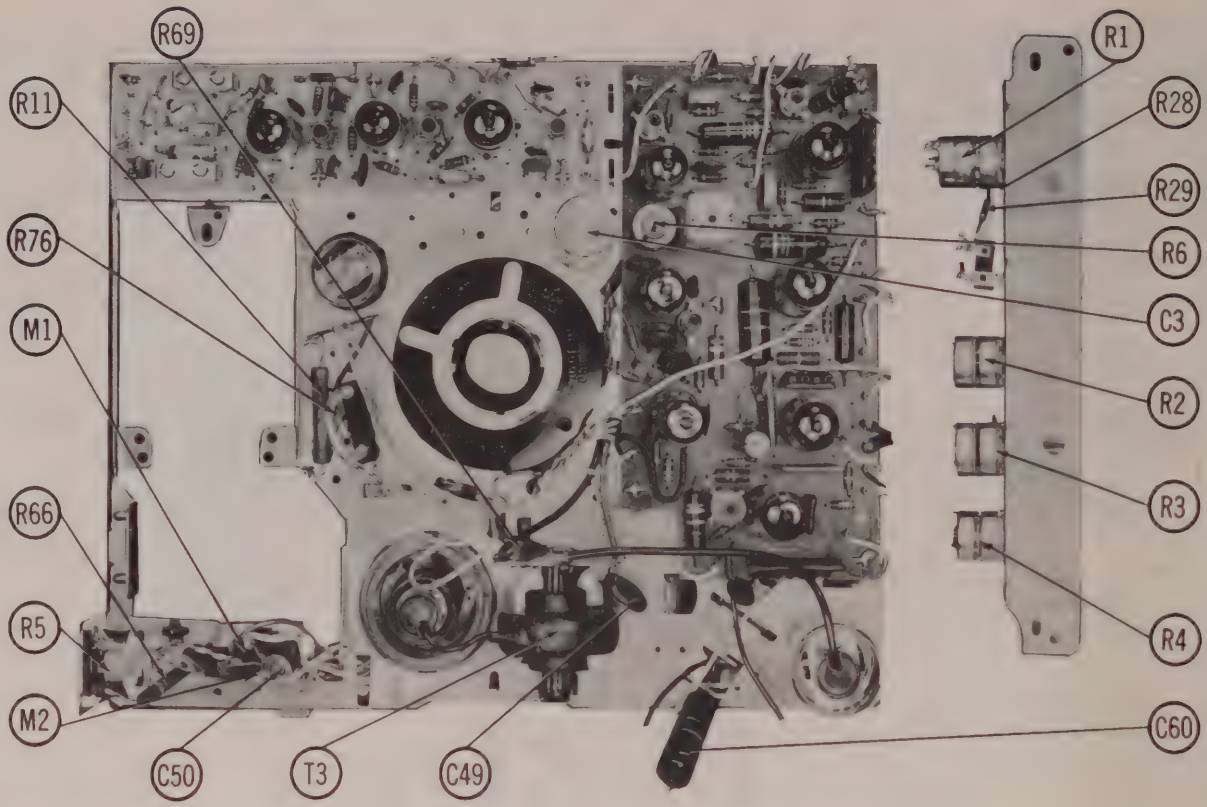
FIG. 203



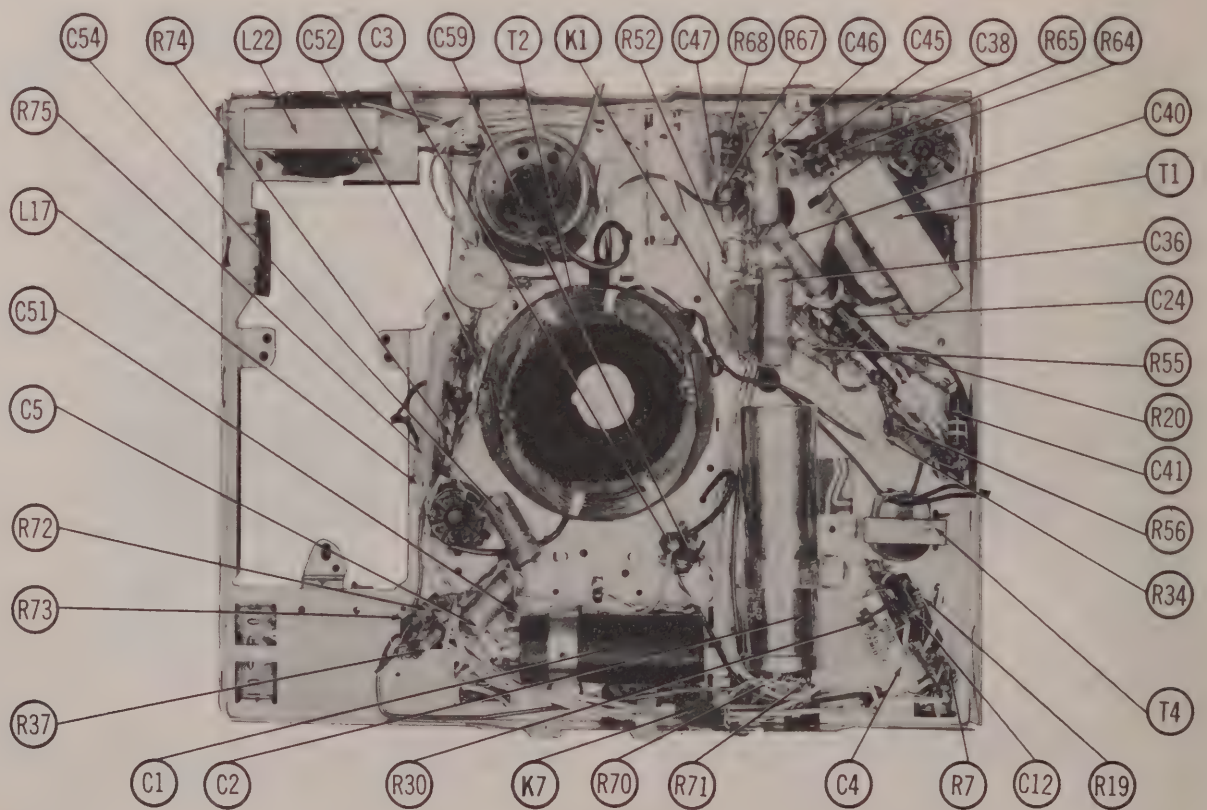
VIDEO IF
PRINTED BOARD

PHILCO MODELS G4231E, L, G4234S, SL, SM, G4640L, W, G4660, UG4231E, L, UG4234S, SL, SM, UG4640L, W, UG4660 (Ch. 9L35, U)

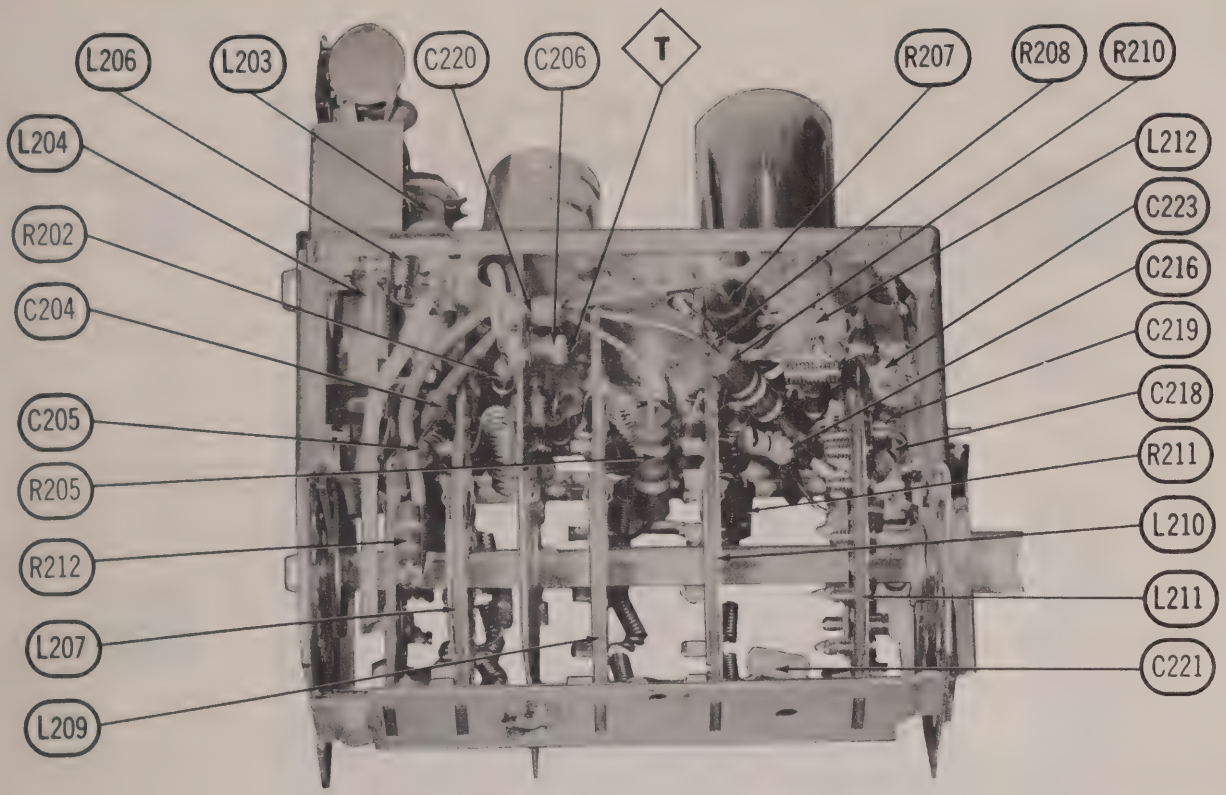
FOLDER 2



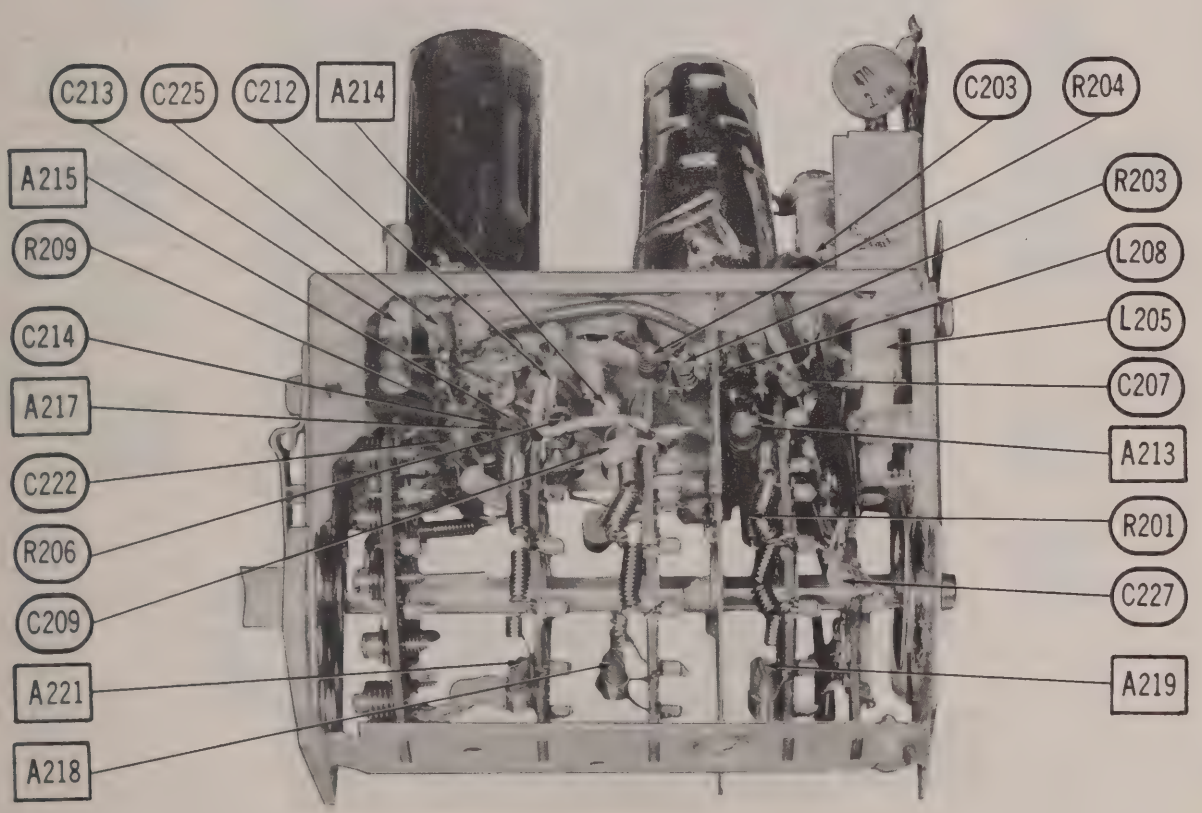
CHASSIS TOP VIEW



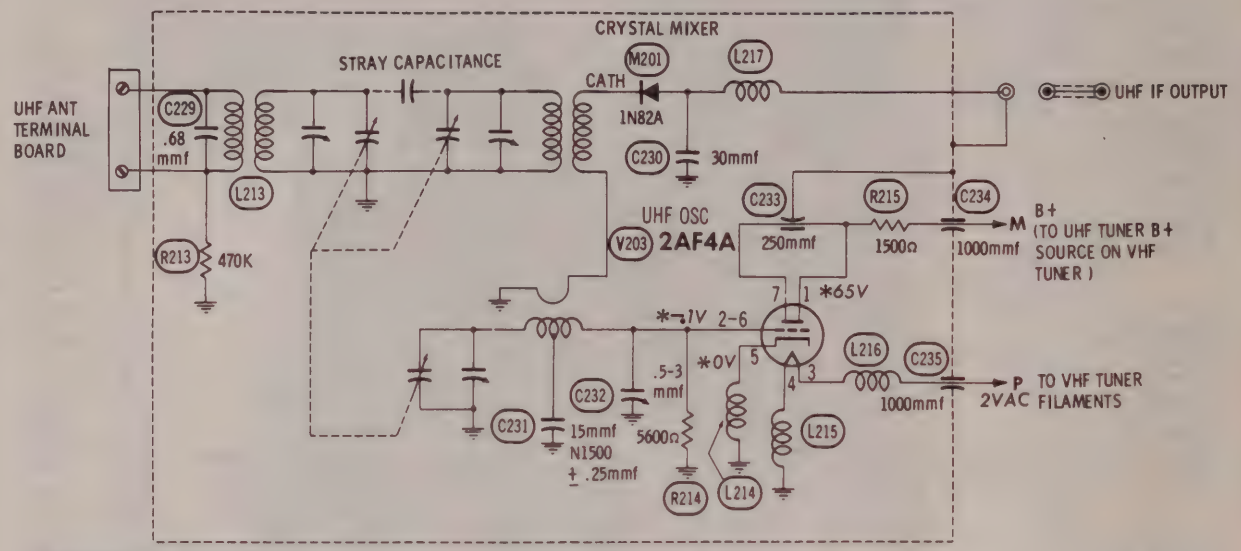
CHASSIS BOTTOM VIEW



TUNER 76-11547-9 (T-69L) - LEFT SIDE



TUNER 76-11547-9 (T-69L) - RIGHT SIDE



* MEASURED IN UHF POSITION.

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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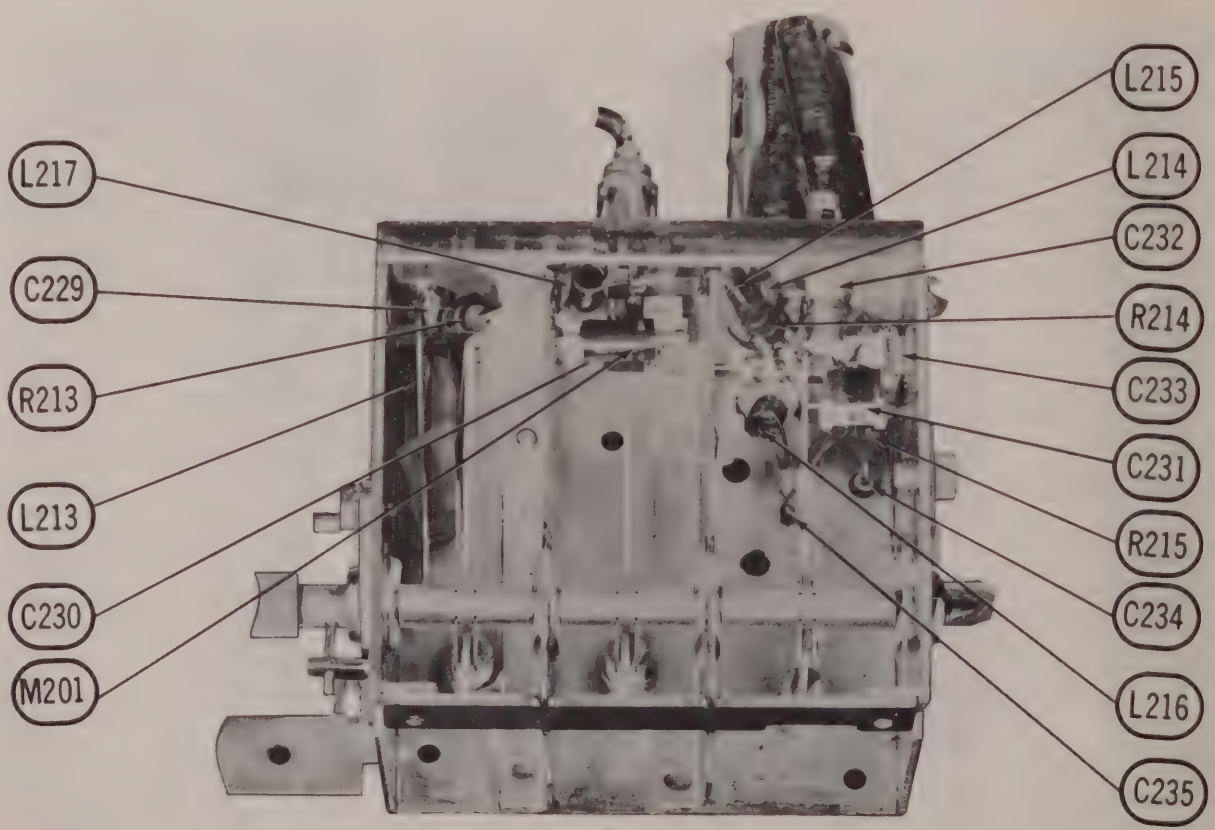
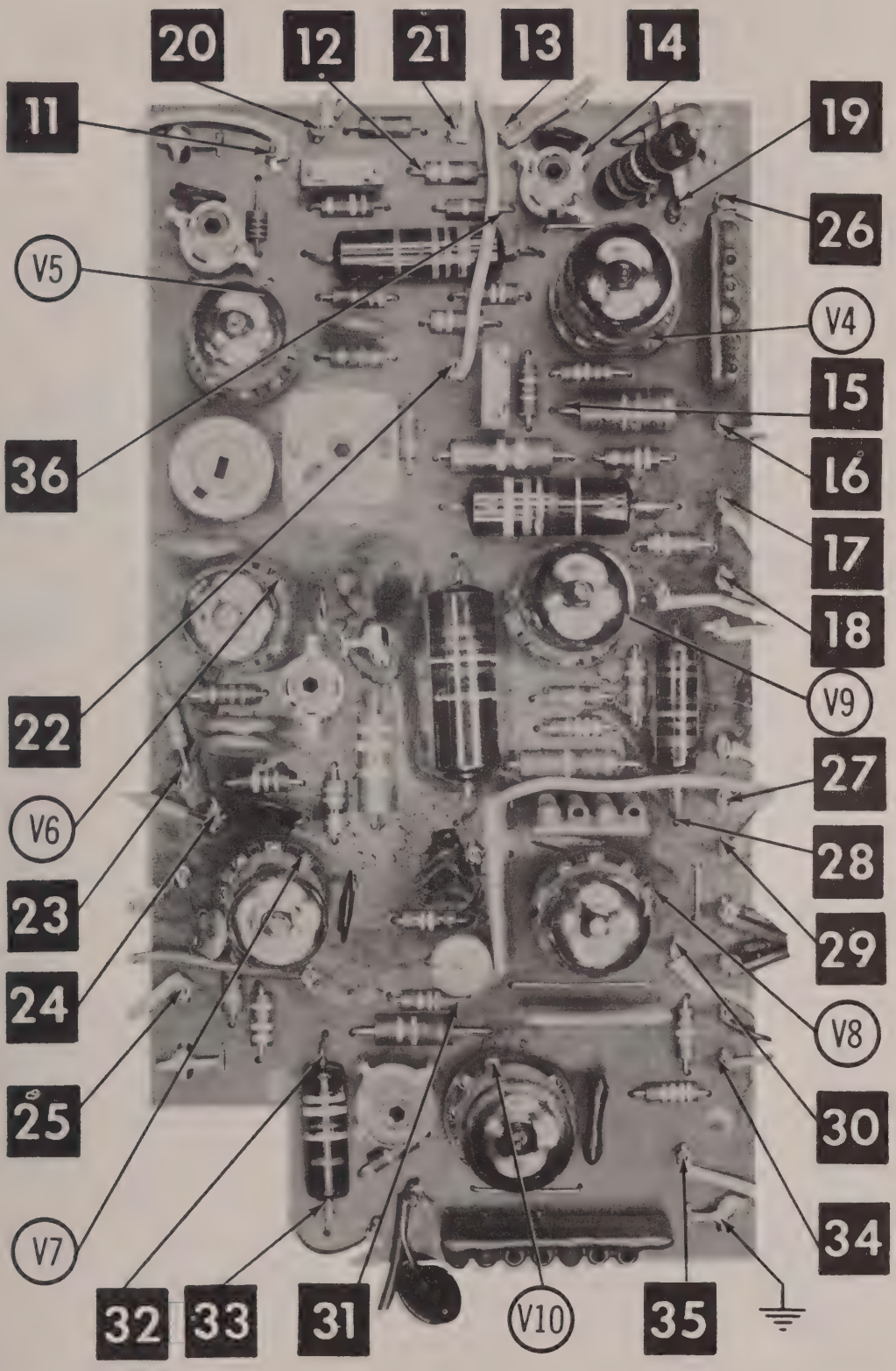
UHF TUNER 76-10391 (T-27E)



UHF TUNER 76-10391 (T-27E)



VIDEO, SOUND, SWEEP
PRINTED BOARD

A Howard W. Sams CIRCUITRACE* Photo
*TRADE MARK

ARROWS INDICATING TUBE LOCATIONS ARE POINTING TO PIN 1 UNLESS OTHERWISE INDICATED

RESISTANCE MEASUREMENTS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	3BZ6	1.5meg	47Ω	13.5Ω	14.5Ω	††330Ω	††330Ω	0Ω		
V2	3BZ6	1.5meg	68Ω	14.5Ω	15.5Ω	††330Ω	††330Ω	0Ω		
V3	5AM8	220Ω	.1Ω	††800Ω	15.5Ω	17Ω	††800Ω	.2Ω	3900Ω	0Ω
V4	6AW8A	3300Ω	•4.5meg	†27K	7.5Ω	9Ω	69Ω	680K	††0Ω	†5400Ω
V5	3AU6	4.3Ω	0Ω	9Ω	9.5Ω	††8200Ω	††8200Ω	180Ω		
V6	3BN6	•240Ω	3.5Ω	10Ω	9.5Ω	††3900Ω	4.8Ω	†330K		
V7	12CA5	¶	460K	10Ω	12Ω	460K	†1000Ω	†295Ω		
V8	9BR7	†35K	2.8meg	0Ω	5.5Ω	5.5Ω	0Ω	830K	150K	4.5Ω
V9	10DE7	†400Ω	2.3meg	2.3meg	7.5Ω	5.5Ω	•‡4.2meg	150K	•18K	•350Ω
V10	6CG7	†17K	1.8meg	1000Ω	3Ω	4.5Ω	†54K	•100K	1000Ω	0Ω
V11	12DQ6A	NC	21Ω	NC	•†11K	1meg	TP	19Ω	0Ω	TOP CAP ‡13.8Ω
V12	12D4GT	NC	NC	¶160K	NC	†1.5Ω	NC	19Ω	17Ω	
V13	1G3GT	PINS 1 THRU 8 HAVE INFINITE RESISTANCE								TOP CAP ‡383.8Ω
V14	21CQP4	NC	•250K	13.5Ω	12Ω	1meg	†0Ω	‡100K		
V201	4BC8	†2800Ω	230K	INF	2Ω	3Ω	INF	1.8meg	0Ω	0Ω
V202	5X8	0Ω	10K	†100K	2Ω	.5Ω	0Ω	100K		
V203	2AF4A	†•14K	•5600Ω	.5Ω	0Ω	.1Ω	•5600Ω	•†14K		
ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9

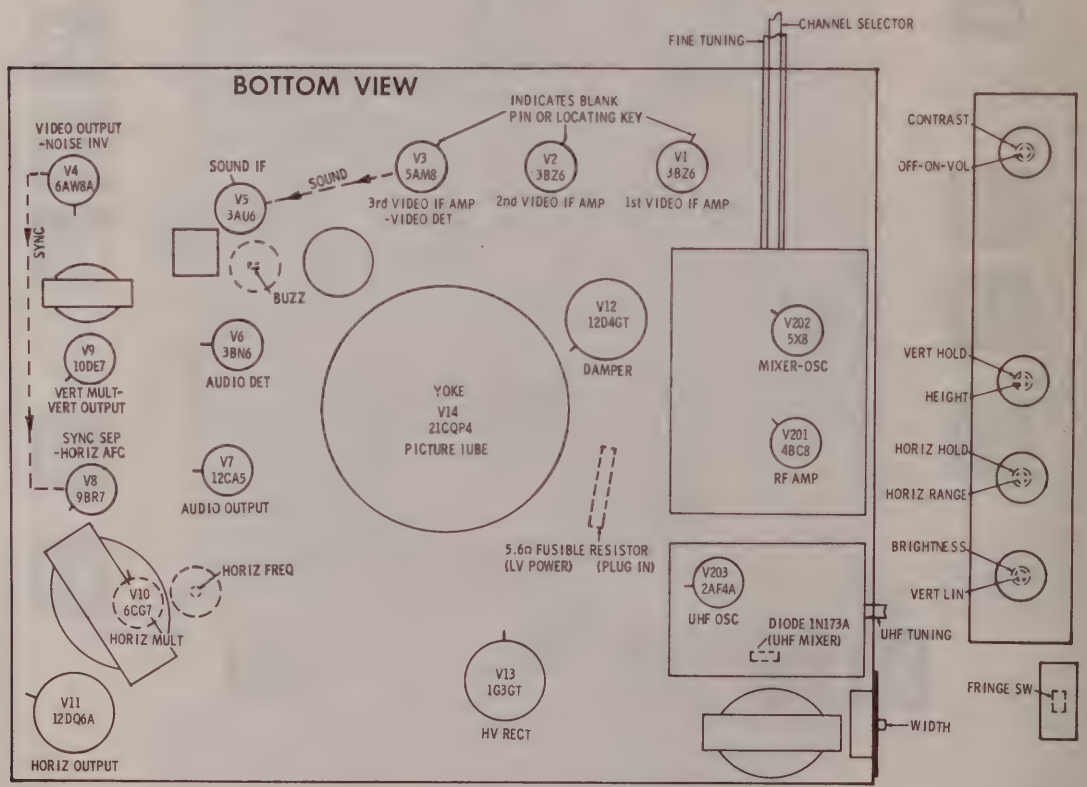
¶ THIS READING WILL VARY DEPENDING UPON THE CONDITION OF THE ELECTROLYTIC CAPACITOR CONNECTED IN THE ASSOCIATED CIRCUIT.

• THIS READING WILL VARY. CONTROL SET FOR NORMAL OPERATION.

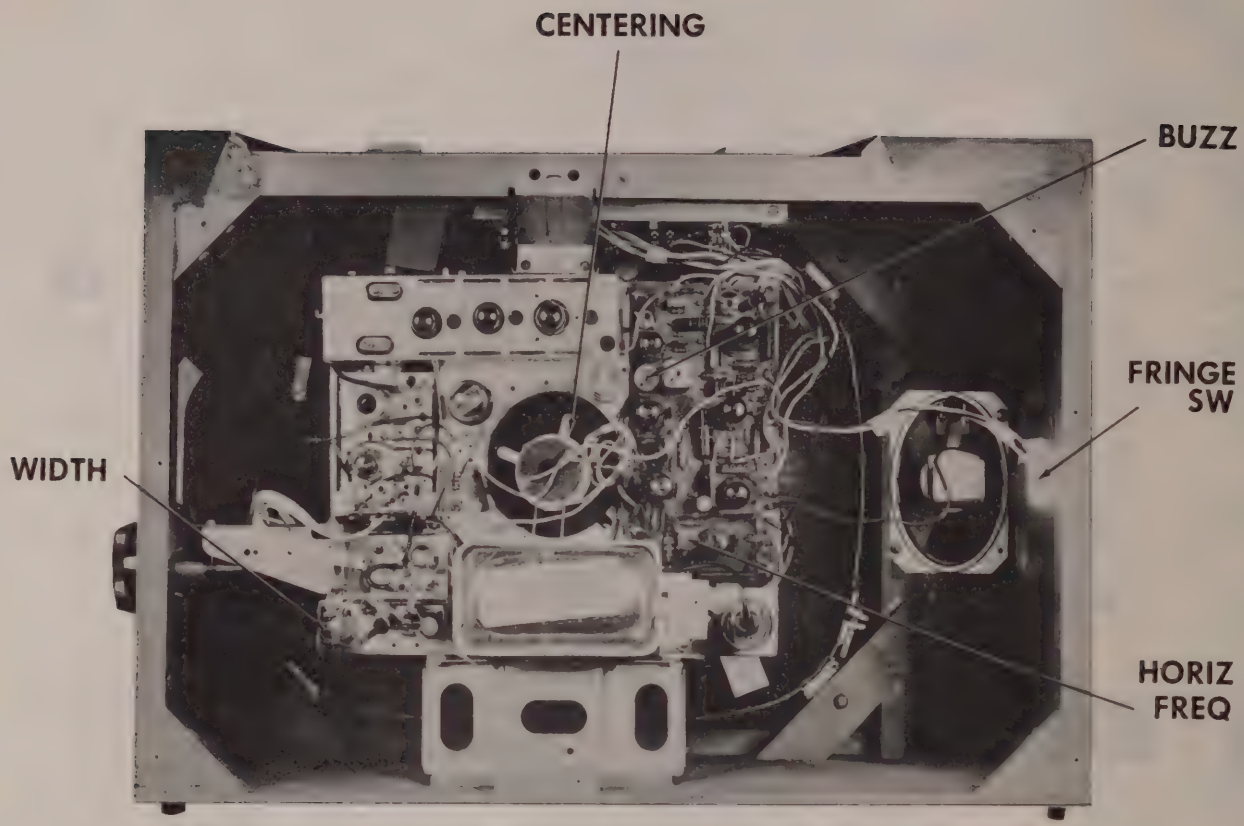
† MEASURED FROM 275V SOURCE. • MEASURED IN UHF POSITION.

†† MEASURED FROM 150V SOURCE. NC NO CONNECTION

‡ MEASURED FROM PIN 3 OF V12. TP TIE POINT



TUBE PLACEMENT CHART



CABINET—REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Suggested alignment tools: General Cement #8282, 8606, 8606L, 9295
Walsco #2526, 2543, 2544, 2545

Turn the set on and tune in a station signal. Allow the receiver to warm up. Connect a clip lead across the Horizontal Frequency coil (L2l).

Set the Horizontal Hold to the center of its range.

Adjust the Horizontal Range (R3B) until the picture appears to float back and forth across the screen.

Remove the clip lead from across L2l and adjust the Horizontal Frequency slug (B1) until the picture synchronizes horizontally.

Adjust Width (R5) for a picture slightly wider than necessary to fill the picture mask horizontally.

PHOTOFACT* Folder

DAVID BOGEN
MODELS K130, K130Y

DAVID BOGEN
MODELS K130, K130Y

MODEL K130

DAVID BOGEN
MODELS K130, K130Y

TRADE NAME	David Bogen Models K130, K130Y
MANUFACTURER	David Bogen Co., P. O. Box 500, Paramus, N. J.
TYPE SET	AC Operated 30 Watt 2 Channel Audio Amplifier (Model K130Y Has 3 Speed Record Player)
TUBES (Eight)	Types 6AV6 Mic Preamplifier, 12AX7/ ECC83 AF Amplifier, 6U8A AF Amp.-Phase Inv., (2) 6AV5GA Output, 6CG7 Volt. Regulator, (2) 5Y3GT Rectifier
POWER SUPPLY	110-120 Volts AC-60 Cycles RATING .92 Amp. @ 117 Volts AC (91 Watts)

VOLTAGE REGULATOR ADJUSTMENT (R5)

1. Turn Mic (R1), Phono (R2) and Volt Reg (R5) controls to minimum.
2. Connect an accurate low range DC voltmeter to one terminal of the CUR MON board and chassis.
3. Adjust Volt Reg (R5) for a slight meter deflection. Note the reading.
4. Measure the voltage on the other terminal of the CUR MON board.
5. Keep the meter connected to that terminal which indicate the highest voltage.
6. Adjust Volt Reg (R5) until the meter indicates .25 volt.

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

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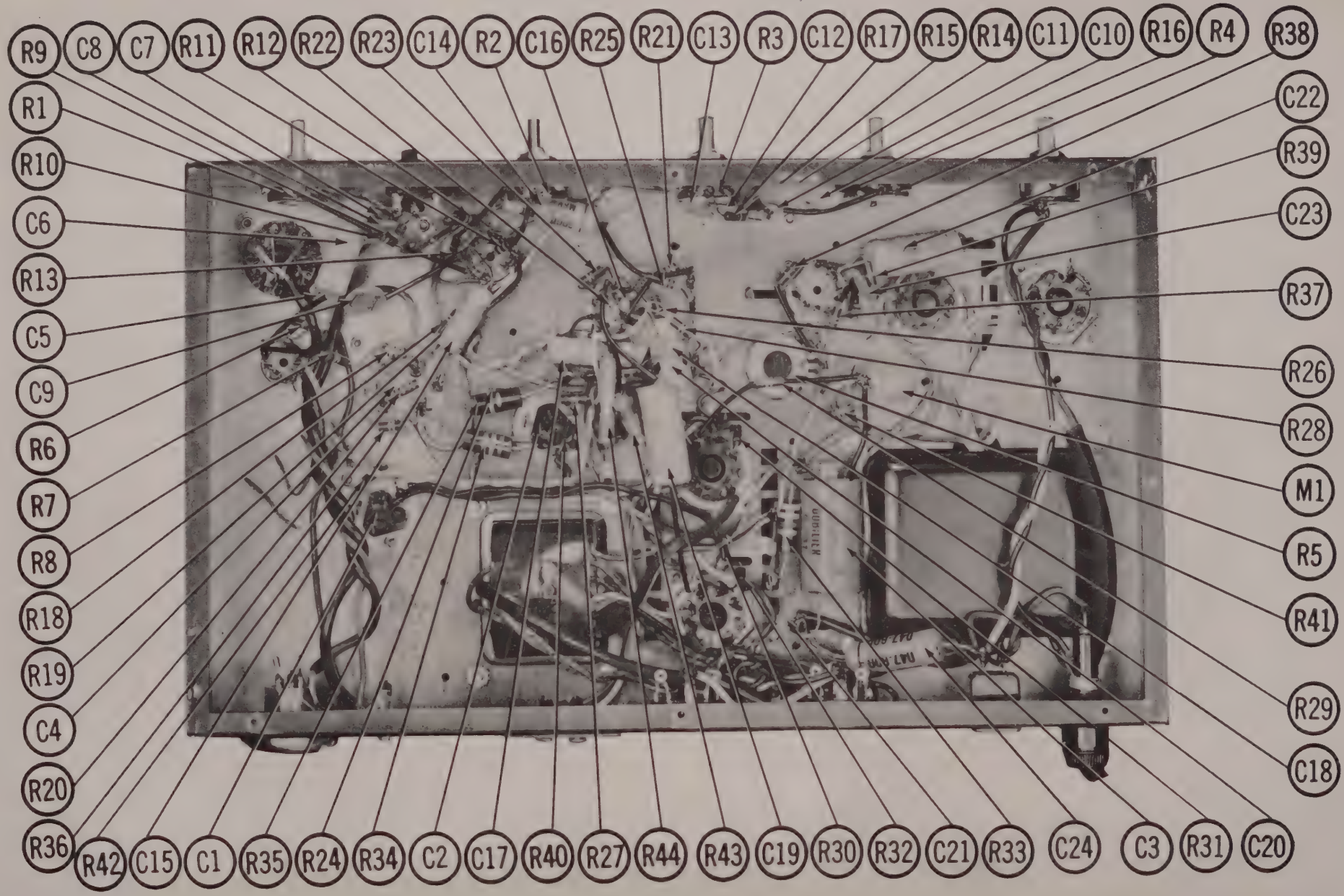


CHASSIS-BOTTOM VIEW

PARTS LIST AND DESCRIPTIONS

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE
V1	Mic Preamplifier	6AV6
V2	AF Amplifier	12AX7/ECC83
V3	AF Amp. -Phase Inv.	6U8A
V4	Output	6AV5GA
V5	Output	6AV5GA
V6	Volt Regulator	6CG7
V7	Rectifier	5Y3GT
V8	Rectifier	5Y3GT

ELECTROLYTIC CAPACITORS

ITEM No.	RATING CAP.	RATING VOLT.	David Bogen PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1	30	400		AFH1-51	A0470	FP145	TMS-56	S-265	TVL-1720
C2	30	400		AFH1-51	A0470	FP145	TMS-56	S-265	TVL-1720
C3	50	100		PRS150V50	BR5015	TC49	TD-50-150	MT-1550	TVA-1414
C4A ●	20	450		APH4-19-10	D0179.3	FP474.5	TMQ-113	Q-035	TVL-4826
B ■	20	450						MT-4510	
C	10	350							
D ▲	10	350							

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING CAP.	RATING VOLT	David Bogen PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C5	.033	200		P288N-033	DF-303	CUB6S33	GEM-4133	6TM-S33	
C6	.047	400		P488N-047	DF-503	CUB4S47	GEM-4147	4TM-S47	
C7	4700					1R5D47		MS-247	10%
C8	1500					1R5D15		MS-215	10%
C9	15000			BPD-015	DD16-153	BYA10S15		5HK-S15	
C10	.1	400		P488N-1	DF-104	CUB4P1	GEM-401	4TM-P1	
C11	100			BPD-0001	DD-101	L10T1	UC-531	5GA-T1	
C12	3300					1R5D33		MS-233	10%
C13	3300					1R5D33		MS-233	10%
C14	.047	400		P486N-047	DF-503	CUB4S47	GEM-4147	4TM-S47	
C15	.022	400		P488N-022	DD-203	CUB4S22	GEM-4122	4TM-S22	
C16	2.4								
C17	.047	200		P288N-047	DF-503	CUB2S47	GEM-4147	2TM-S47	
C18	22			N750-DI22	DTN-22	C10Q22U		5TCU-Q22	N750
C19	.1	600		P688N-1	DF-104	CUB6P1	GEM-601	6TM-P1	
C20	.1	600		P688N-1	DF-104	CUB6P1	GEM-601	6TM-P1	
C21	1500					1R5D15		MS-215	10%
C22	.1	400		P488N-1	DF-104	CUB4P1	GEM-401	4TM-P1	
C23	10000			BPD-01	DD-103	BYA6S1	DC511	5HK-S1	
C24	.047	600		P688N-047	DF-503	CUB6S47	GEM-6147	6TM-S47	

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	David Bogen PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	500K	½	V367	B-60	A47-500K-Z	Q13-133	U48	Mic
B	Shaft			Not Req.	FS-3	Not Req.	Not Req.	
R2A	500K	½	V367	B-60	A47-500K-Z	Q13-133	U48	Phono
B	Shaft			Not Req.	FS-3	Not Req.	Not Req.	
R3A	1meg	½	V376	B-69	A47-1meg-S	Q11-137	U54	Bass
B	Shaft			Not Req.	FS-3	Not Req.	Not Req.	
R4A	500K	½	V375	BT-65	A47F5-500K	Q19-133X	UT-431	Treble, Tap @ 250K
B	Shaft			Not Req.	FS-3	Not Req.	Not Req.	
R5A	100K	½	V392	AB-40	A47-100K-S	Bil-128	TA15L	Volt Reg. Adj.
B	Shaft			AK-1	FKS-1/4	TM1	Not Req.	

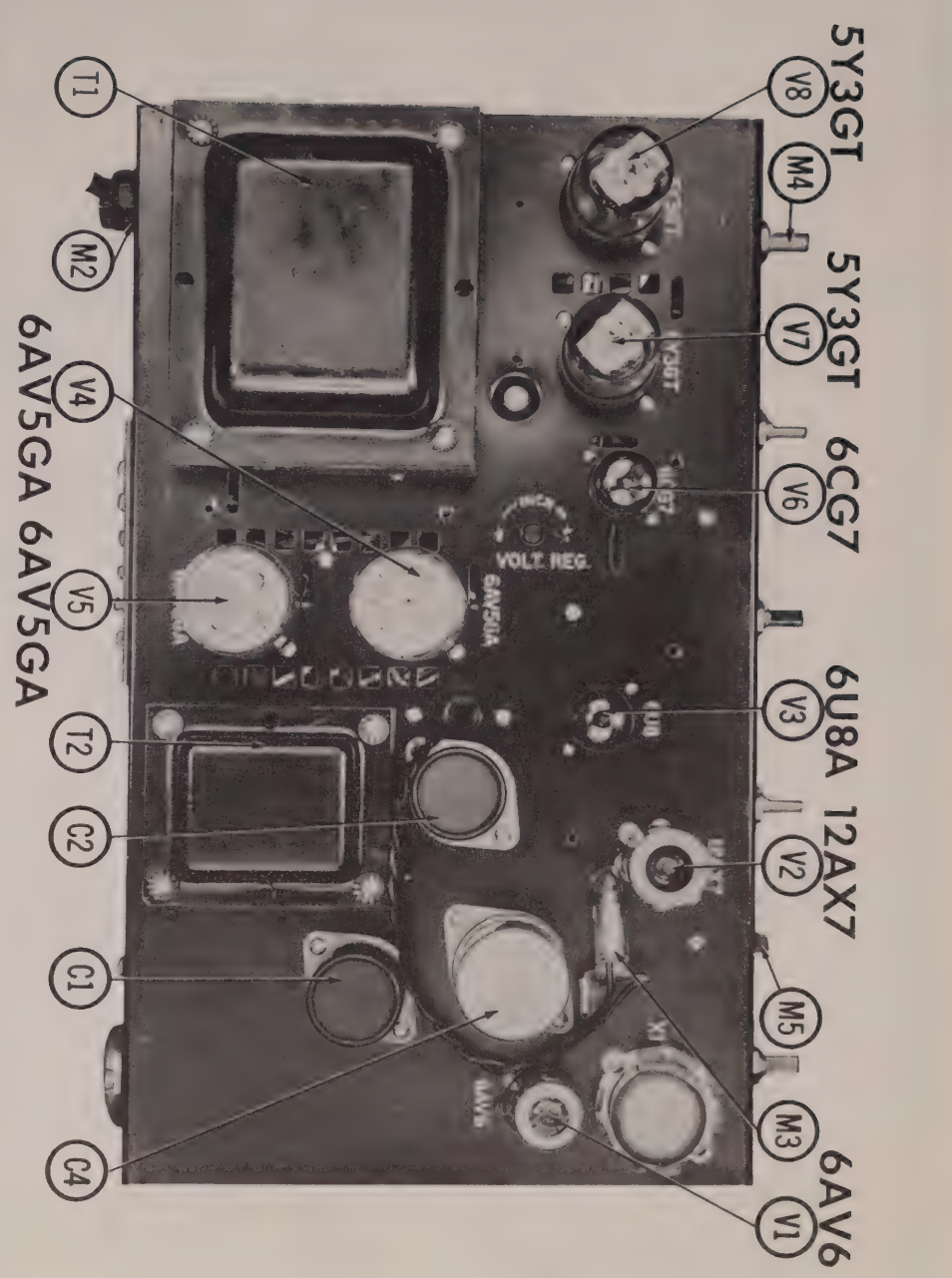
RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING OHMS	RATING WATT	David Bogen PART No.	NOTES
R6	3.3meg			
R7	100K			
R8	47K			
R9	180K			
R10	220K			
R11	270K			
R12	100K			
R13	1000Ω			

ITEM No.	RATING OHMS	RATING WATT	David Bogen PART No.	NOTES
R14	100K			
R15	100K			
R16	100K			
R17	470K			
R18	100K			
R19	1800Ω			
R20	33K			
R21	47K			

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS (cont)

ITEM No.	RATING OHMS	RATING WATT	David Bogen PART No.	NOTES
R22	390K			
R23	150K			
R24	390Ω			
R25	470K			
R26	470K			
R27	15K			
R28	100K			
R29	220K			
R30	220K			
R31	15Ω 5%			
R32	15Ω 5%			
R33	3300Ω	2		

ITEM No.	RATING OHMS	RATING WATT	David Bogen PART No.	NOTES
R34	27K	2		
R35	200K 5%	2		
R36	15K			
R37	680K			
R38	2.7meg			
R39	1meg			
R40	1meg			
R41	68K			
R42	1meg			
R43	68Ω	1		
R44	2.7Ω	1		

TRANSFORMER (POWER)

ITEM No.	RATING PRI.	RATING SEC. 1	RATING SEC. 2	REPLACEMENT DATA David Bogen PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117 V @ .92A	860VCT @ .070A tap @ 35V @ .001A	5V @ 4A	T3154						
	SEC. 3 6.3VCT @ 4.5A									

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE PRI.	IMPEDANCE SEC.	REPLACEMENT DATA David Bogen PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T2	5600Ω CT	167Ω or 70V SEC 2 16Ω Tap @ 8Ω, 4Ω	T2128							

SELENIUM RECTIFIER

ITEM No.	RATING CURRENT (Measured)	REPLACEMENT DATA David Bogen PART No.	FEDERAL PART No.	INTERNATIONAL PART No.	SARKES TARZIAN PART No.	NOTES
M1	.0006A	H373	1159	D-5410	10	

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA David Bogen PART No. FUSE	David Bogen PART No. HOLDER	LITTELFUSE PART No. FUSE	LITTELFUSE PART No. HOLDER	BUSS PART No. FUSE	BUSS PART No. HOLDER
M2	3AG	2A 125V S/B			313002. (3AG 2A 125V S/B)	342001	MDX2	HKP

MISCELLANEOUS

ITEM No.	PART NAME	David Bogen PART No.	NOTES
M3	Lamp		#51
M4	Switch	S434	Power, On-Off, Rotary, Snap Type
M5	Switch	S381	Speech Filter, DPDT, Slide Type

CABINETS & CABINET PARTS

(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

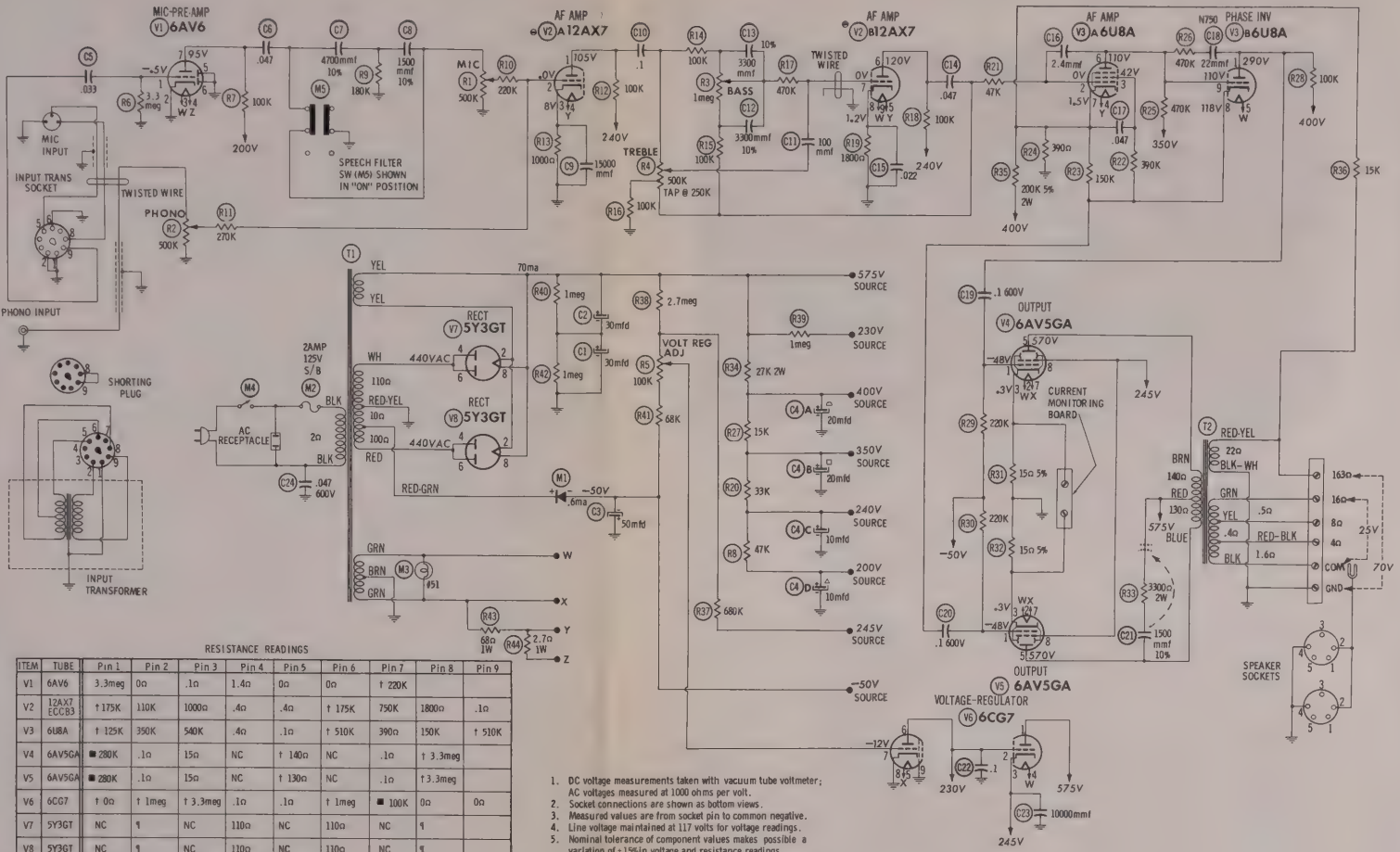
WIRING DATA

General-use Unshielded Hook-up Wire ..... Use BELDEN No. 8530 (Solid) Available in Ten Colors
8524 (Stranded) Available in Ten Colors

Power Cord ..... Use BELDEN No. 1765-B (6 Ft. Length)
1725-K (7½ Ft. Length)

Low-Loss Shielded Lead (Interconnecting) ..... Use BELDEN No. 8401

Phono Pick-up Arm Cable ..... Use BELDEN No. 8430 (Two Conductor - Twisted)



RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	6AV6	3.3meg	0Ω	.1Ω	1.4Ω	0Ω	0Ω	† 220K		
V2	12AX7 ECC83	† 175K	110K	1000Ω	.4Ω	.4Ω	† 175K	750K	1800Ω	.1Ω
V3	6U8A	† 125K	350K	540K	.4Ω	.1Ω	† 510K	390Ω	150K	† 510K
V4	6AV5GA	■ 280K	.1Ω	15Ω	NC	† 140Ω	NC	.1Ω	† 3.3meg	
V5	6AV5GA	■ 280K	.1Ω	15Ω	NC	† 130Ω	NC	.1Ω	† 3.3meg	
V6	6CG7	† 0Ω	† 1meg	† 3.3meg	.1Ω	.1Ω	† 1meg	■ 100K	0Ω	0Ω
V7	5Y3GT	NC	¶	NC	110Ω	NC	110Ω	NC	¶	
V8	5Y3GT	NC	¶	NC	110Ω	NC	110Ω	NC	¶	

¶ THIS READING WILL VARY DEPENDING UPON THE CONDITION OF THE ELECTROLYTIC CAPACITOR CONNECTED IN THE ASSOCIATED CIRCUIT.
† MEASURED FROM PIN 8 OF V8
■ MEASURED FROM NEGATIVE TERMINAL OF MI
NC NO CONNECTION

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance of component values makes possible a variation of ±15% in voltage and resistance readings.
6. All controls at minimum, proper output load connected.

Θ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

A PHOTOFACT STANDARD NOTATION SCHEMATIC
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PHOTOFACT* Folder

TRADE NAME	David Bogen Model RI-6 Master Station, F2 Indoor Remote, F3 Outdoor Remote
MANUFACTURER	David Bogen Co., Inc. P. O. Box 500, Paramus, N. J.
TYPE SET	AC-DC Operated AM Receiver And Intercommunication System
TUBES (Six)	Types 12BE6 Converter, 12BA6 IF Amplifier, 12AV6 Det.-AVC-AF Amp., 12AU6 AF Amplifier, 35C5 Output, 35W4 Rectifier
POWER SUPPLY	110-120 Volts AC-60 Cycles
RATING	.275 Amp. @ 117 Volts AC (25 Watts)
TUNING RANGE—BROADCAST	530-1650KC

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Use isolation transformer, if available. If not, connect a .1mfd capacitor in series with low side of signal generator and B-. Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.01mfd	Highside to Pin 7 (grid) of 12BE6(V1) Lowside to B-	455KC (400∿ Mod.)	Tuning gang Fully Open	Across Voice Coil	A1, A2, A3, A3	Adjust for max. output
2.	"	High side to AM antenna terminal. Low side to B- .	1600KC	1600KC	"	A5	"
3.	"	"	1400KC	Tune to 1400KC Signal	"	A6	"
4.	"	"	600KC	600KC	"	A7, A8	Adjust for max. output while rocking tuning gang. Repeat steps 2, 3, & 4.

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

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H739

DAVID BOGEN
MODEL RI-6
DAVID BOGEN
MODEL RI-6
SET 425 FOLDER 4

PARTS LIST AND DESCRIPTIONS

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE	NOTES
V1	Converter	12BE6	
V2	IF Amplifier	12BA6	
V3	Det. -AVC-AF Amp.	12AV6	

ITEM No.	USE	TYPE	NOTES
V4	Intercom Pre-Amp.	12AU6	
V5	Output	35C5	
V6	Rectifier	35W4	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT.	David Bogen PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1A	20	150		PRS150V2020	BBRD2215	TCD45	TDLD-3	MTD-1520	TVA-2428
B	20	150							
C2A	20	150		PRS150V2020	BBRD2215	TCD45	TDLD-3	MTD-1520	TVA-2428
B	20	150							
C3	4	15		PRS150V4	BBR4-50	TT25X5	TD-4-25	MT-0504	TVA-1402

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP.	VOLT	David Bogen PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	SPRAGUE PART No.	
C4	4.7			NPO-DI4.7	MD-4R7	C10V47C	ZT-5547	5TCCB-V47	10%
C5	10000			BPD-01	DD-103	BYA10S1	5HK-S1	5HK-S1	
C6	47				DTN-47				N750 5%
C7	4.7								N2200 10%
C8	.047	200		P288N-047	DF-503	CUB2S47	GEM-4147	2TM-S47	
C9	10000			BPD-01	DD-103	BYA10S1	5HK-S1	5HK-S1	
C10	4700								10%
C11	680				MD-681				10%
C12	3300								10%
C13	220				MD-221	L10T22			10%
C14	1000								10%
C15	4700								10%
C16	10000			BPD-01	DD-103	BYA10S1	5HK-S1	5HK-S1	
C17	10000			BPD-01	DD-103	BYA10S1	5HK-S1	5HK-S1	
C18	.22	200		P288N-22		CUB2P22	GEM-2022	2TM-P22	
C19	.0068	600		P688N-0068	D6-682	CUB6D68	GEM-6268	6TM-D68	
C20	150			NPO-DI150	DD-151	L10T15	ZT-5315	5TCC-T15	10%
C21	.1	400		P488N-1	DF-104	CUB4P1	GEM-401	4TM-P1	

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	David Bogen PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1A	500K	½	V403	B-60	A47-500K-Z	Q13-133	U48	Volume, Radio
B	Shaft			Not Req.	FS-3	Not Req.	Not Req.	
C	Switch			KB-lorKR-1*	SWE-12	76-1	US-26	
R2A	500K	½	V404	B-60	A47-500K-Z	Q13-133	U48	Volume, Intercom
B	Shaft			Not Req.	FS-3	Not Req.	Not Req.	

* Use KR with CRL "Red Label" controls and KB with "Blue Label" controls.

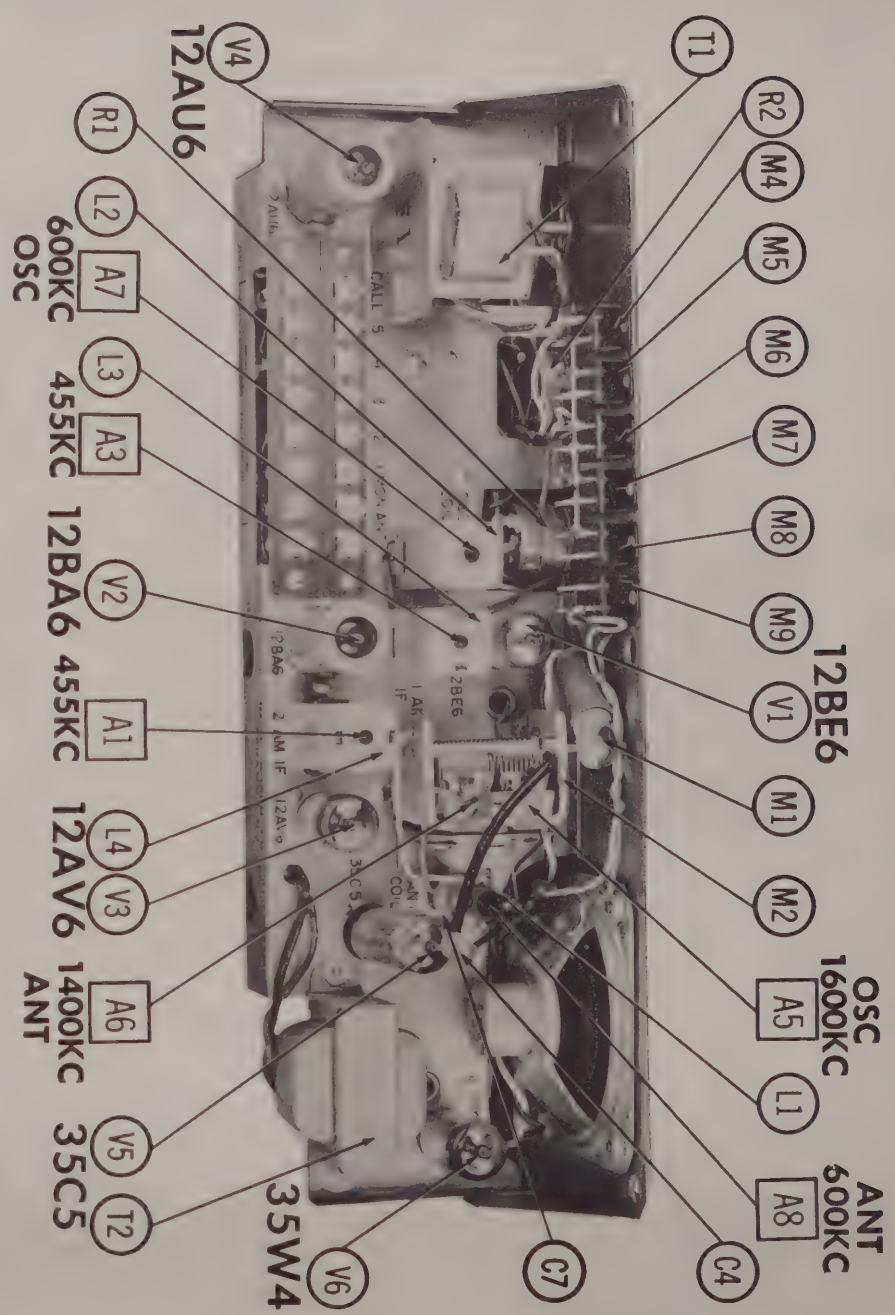
RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING		David Bogen PART No.	NOTES
	OHMS	WATT		
R3	220Ω			
R4	22K			
R5	3.3meg			
R6	220Ω			
R7	120K			
R8	270K			
R9	4.7meg			
R10	270K			
R11	330K			
R12	3.3meg			

ITEM No.	RATING		David Bogen PART No.	NOTES
	OHMS	WATT		
R13	12K			
R14	220K			
R15	390K			
R16	22K			
R17	1.5meg			
R18	220K			
R19	680K			
R20	150Ω	1		
R21	1000Ω	1		
R22	220Ω	2		

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA					
		David Bogen PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No.	NOTES
L1	Ant. Coil	U321					▲ Disregard tap on pri.
L2	Osc. Coil	H630					
L3	1st IF	H386	▲16-6764	BC-352	12-C1	RF-1	
L4	2nd IF	H386	▲16-6764	BC-353	12-C2	RD-2	

TRANSFORMER (DRIVER)

ITEM No.	TURNS RATIO		REPLACEMENT DATA						NOTES
	PRI.	SEC.	David Bogen PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T1	1	: 85	T139-4	Z1119	A-2937	A-4744	20A04	A-13X ①	①Drill new mounting hole
	IMPEDANCE								
	3-4Ω	25K							

SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	David Bogen PART No.	QUAM PART No.	
SP1	3½"	PM	3-4Ω	L135	3A07	
SP2	3½"	PM	3-4Ω	L135	3A07	

COMPONENT COMBINATIONS

ITEM No.	USE	DESCRIPTION	David Bogen PART No.	REPLACEMENT DATA	
K1	Diode Filter	100mmf, 100mmt, 47K	C325	Aerovox Centralab Cornell- Dubilier Sprague	PA-97 PC-50 111TM1 D-1

MISCELLANEOUS

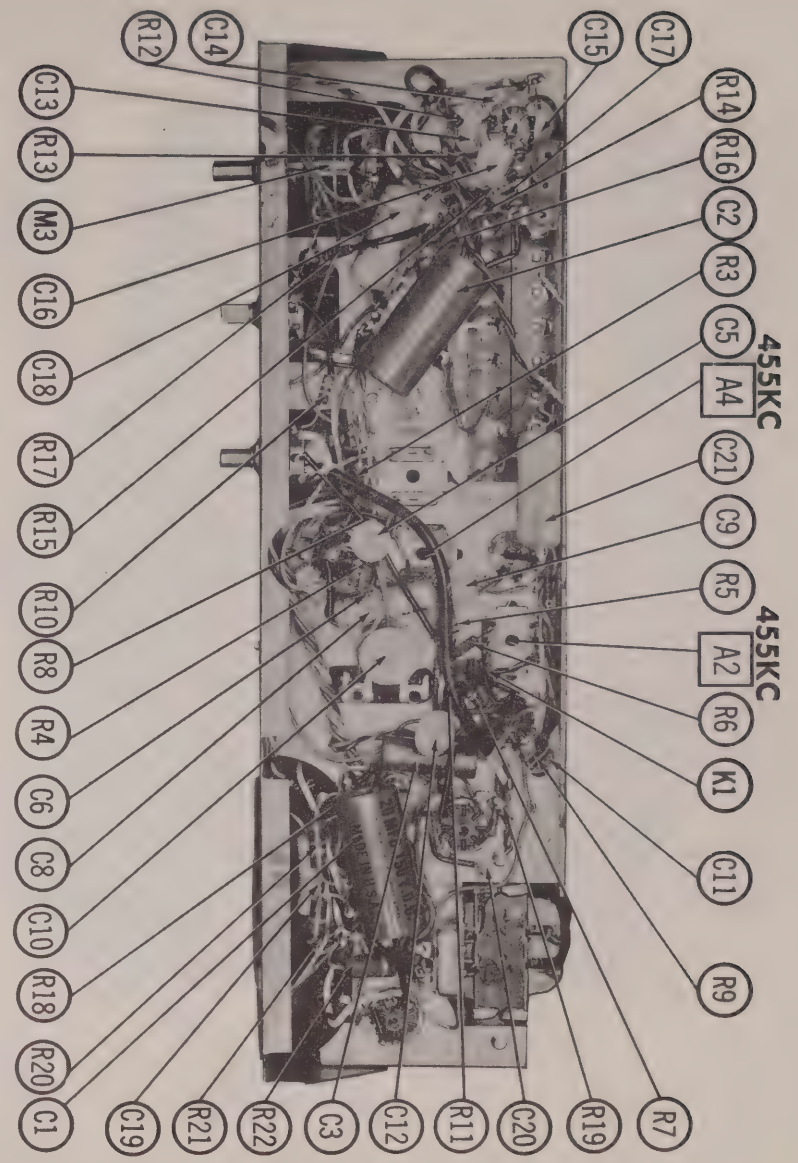
ITEM No.	PART NAME	David Bogen PART No.	NOTES
M1	Lamp		#47
M2	Tuning Cap.	C643A	2 Gang (Ant. 26-327mmf, Osc. 18-129mmf)
M3	Switch	S471B	Function, Rotary, Wafer Type
M4	Switch	S381	Master, On-Off, SPST, Slide Type
M5	Switch	S381	Monitor, SPST, Slide Type
M6	Switch	S381	Monitor, SPST, Slide Type
M7	Switch	S381	Monitor, SPST, Slide Type
M8	Switch	S381	Monitor, SPST, Slide Type
M9	Switch	S381	Monitor, SPST, Slide Type
M10	Switch	S381	Normal-Private, SPST, Slide Type (Remote Station)
M11	Switch	S475	Monitor-Normal-Call, DP3T, Slide Type (Remote Station)

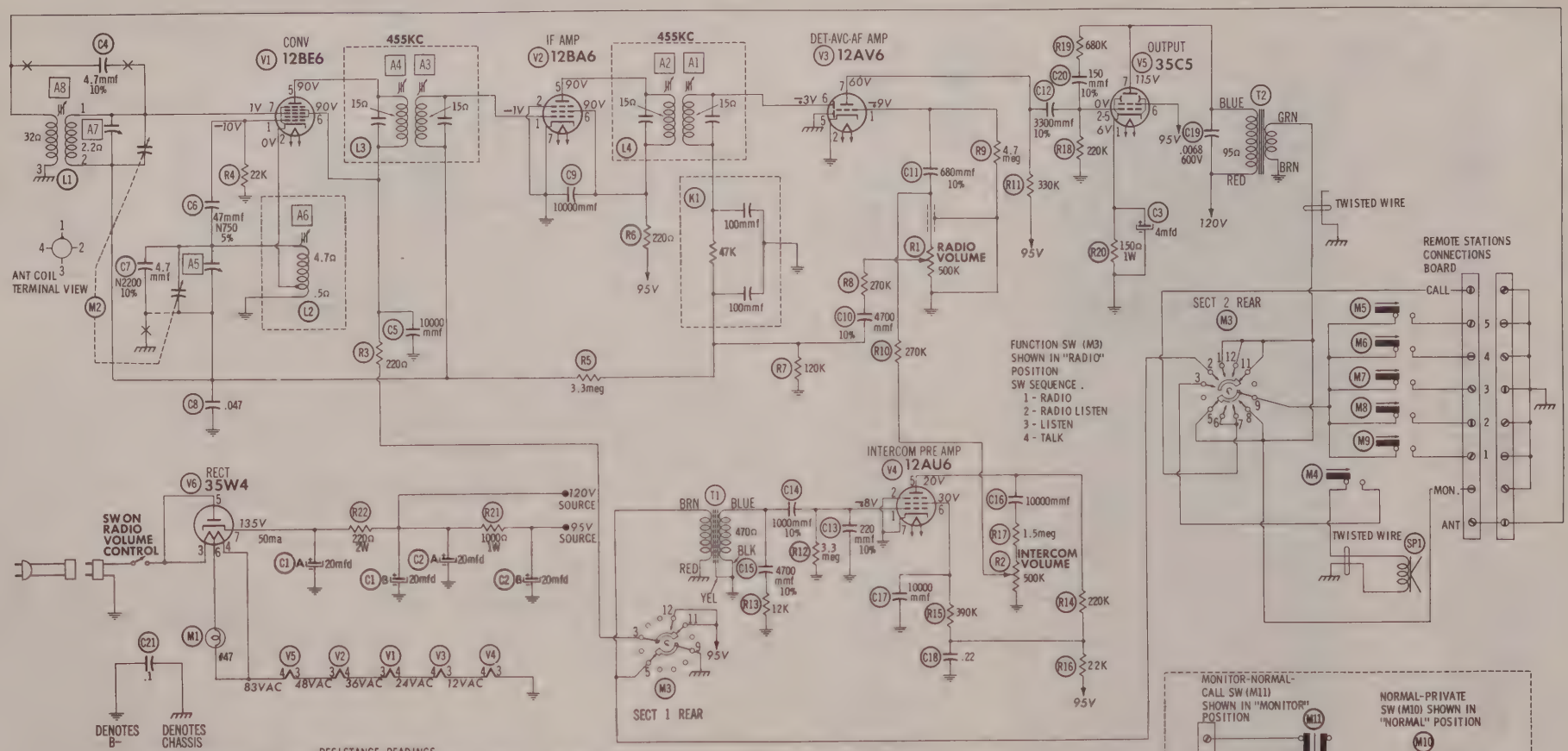
WIRING DATA

General-use Unshielded Hook-up Wire ..... Use BELDEN No. 8530 (Solid) Available in Ten Colors
8524 (Stranded) Available in Ten Colors

Power Cord ..... Use BELDEN No. 1765-B (6 Ft. Length)
1725-K (7½ Ft. Length)

CHASSIS—BOTTOM VIEW





RESISTANCE READINGS

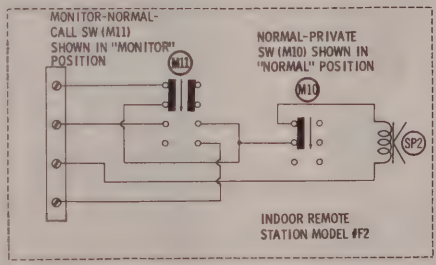
ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V1	12BE6	22K	.5Ω	36Ω	24Ω	† 1400Ω	† 1400Ω	3.4meg
V2	12BA6	3.4meg	0Ω	48Ω	36Ω	† 1400Ω	† 1400Ω	0Ω
V3	12AV6	4.7meg	0Ω	12Ω	24Ω	0Ω	160K	† 330K
V4	12AU6	3.3meg	0Ω	0Ω	12Ω	† 240K	† 410K	0Ω
V5	35C5	150Ω	220K	48Ω	83Ω	220K	† 1200Ω	† 315Ω
V6	35W4	NC	NC	108Ω	83Ω	108Ω	102Ω	¶

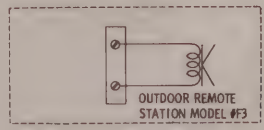
¶ THIS READING WILL VARY DEPENDING UPON THE CONDITION OF THE ELECTROLYTIC CAPACITOR CONNECTED IN THE ASSOCIATED CIRCUIT.
† MEASURED FROM PIN 7 OF V6
NC NO CONNECTION

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

⊖ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM


MONITOR-NORMAL-CALL SW (M11) SHOWN IN "MONITOR" POSITION
NORMAL-PRIVATE SW (M10) SHOWN IN "NORMAL" POSITION
INDOOR REMOTE STATION MODEL #F2



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EIA

DEWALD
MODEL L-546

DEWALD
MODEL L-546

DEWALD
MODEL L-546

TRADE NAME	Dewald Model L-546
MANUFACTURER	Dewald Radio Mfg. Corp., 35-15 37th Ave., Long Island City 1, N. Y.
TYPE SET	Battery Operated Portable Transistorized AM Receiver
POWER SUPPLY	9 Volts DC
RATING	12 MA @ 9 Volts DC
TUNING RANGE—BROADCAST	540-1650 KC

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.		Loop	455KC (400~ Mod.)	Tuning Gang Fully Open	Across Voice Coil	A1, A2	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
2		"	1600KC	1600KC	"	A3	"
3.		"	600KC	600KC	"	A4	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output while rocking tuning gang.
4.		"	1400KC	Tune To 1400KC Signal	"	A5	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

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H740

PARTS LIST AND DESCRIPTIONS

TRANSISTORS

ITEM No.	ORIG. TYPE	USE	REPLACEMENT DATA				NOTES
			CBS PART No.	RCA PART No.	RAYTHEON PART No.	SYLVANIA PART No.	
X1	2N435	Converter		2N140	2N486	2N140	PNP Note 1
X2	2N483	IF Amplifier		2N139	2N483	2N139	PNP Note 2
X3	CK882	AF-Amp.		2N217	2N362	2N217	PNP Note 3
X4	CK888	Output		2N217	2N631	2N217	PNP Note 3

Note 1. Alternate types CK760, 2N112, 2N140
Note 2. Alternate types CK760A, 2N112A, 2N139
Note 3. Alternate type 2N217

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT.	DEWALD PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1	50	10		XPP-10050	NL50-10	TT10X50	ML50-15	MQ-0150	TE-1160
C2	8	12		XPP-12008	NL10-15	TT25X8	ML8-15		TE-1127.3
C3	8	12	①	XPP-12008	NL10-15	TT25X8	ML8-15		TE-1127.3
C4	50	5		XPP-6050	NL50-6	TT6X50	ML50-6	MQ-650	TE-1100
C5	8	12	①	XPP-12008	NL10-15	TT25X8	ML8-15		TE-1127.3

① Some versions may use 6mfd in this application.

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP.	VOLT	DEWALD PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	SPRAGUE PART No.	
C6	20000			BPD-02	DD-203	BYB6S2		5HK-S2	
C7	20000			BPD-02	DD-203	BYB6S2		5HK-S2	
C8	10000			BPD-01	DD-103	BYA10S1	DC511	5HK-S1	
C9	20000			BPD-02	DD-203	BYB6S2		5HK-S2	
C10	4.7			NPO-S14.7	TCZ-4R7	CTA6V47C	ZT-5547	5TCCB-V47	10%
C11	20000			BPD-02	BPD-02	BYB6S2		5HK-S2	
C12	10000			BPD-01	BPD-01	BYA10S1	DC511	5HK-S1	
C13	220				MD-221	L10T22		5TCC-T22	10% ①

① Some versions may use 10000mmf in this application.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	DEWALD PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1	10K	½	V-311		44S-10K-W			Volume and Switch

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING		DEWALD PART No.	NOTES
	OHMS	WATT		
R2	33K			
R3	18K			
R4	1000Ω			
R5	4700Ω			
R6	1000Ω			
R7	1000Ω			
R8	1000Ω			
R9	150K			

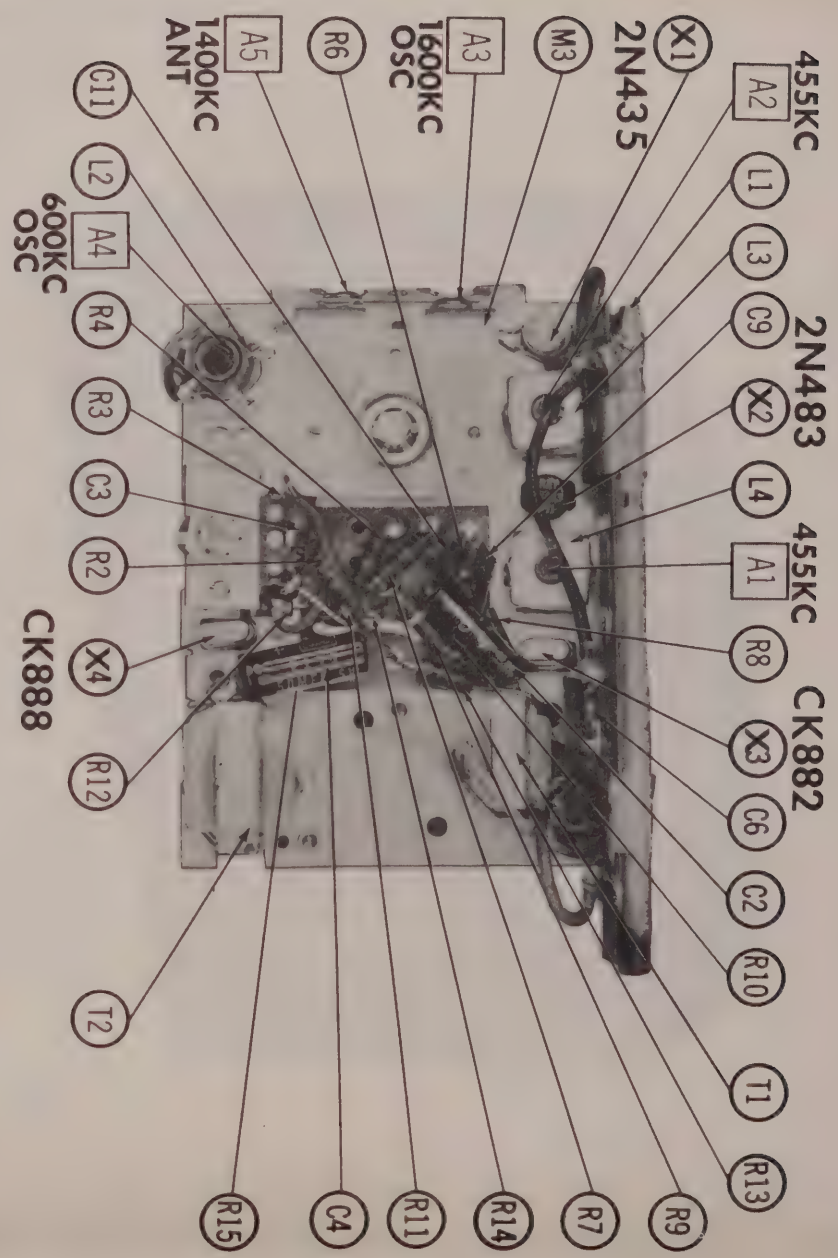
ITEM No.	RATING		DEWALD PART No.	NOTES
	OHMS	WATT		
R10	10K			
R11	27K			
R12	4700Ω			
R13	1000Ω			
R14	4300Ω 5%			
R15	560Ω			
R16	82Ω			
R17	470Ω			

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA					
		DEWALD PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No.	NOTES
L1	Loop Stick	L-138G1					Note 1
L2	Osc. Coil	O-137			2022		
L3	1st IF Trans.	I-131-3	16-9012		9-C1		
L4	2nd IF Trans.	I-131-4	16-9014		9-C2		

Note 1. Alternate Part #L-138A

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (DRIVER)

ITEM No.	TURNS RATIO		REPLACEMENT DATA						NOTES
	PRI.	SEC.	DEWALD PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T1	4.5	: 1	T-135A-1				TR-17		

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA							NOTES
	PRI.	SEC.	DEWALD PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T2	1300Ω	17Ω	T-1360-2	GH7 ①			TA-9 ①		TY-44X①	① Use Original Channel Frame

SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	DEWALD PART No.	QUAM PART No.	
SP1	2 3/4"	PM	17Ω	S-712		

BATTERIES

ITEM No.	VOLTAGE	DEWALD PART No.	REPLACEMENT DATA						NOTES
			BURGESS		EVEREADY		MALLORY		
			"A"	"B"	"A"	"B"	"A"	"B"	
M1	9V			2N6		246		M-1602	

CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA			NOTES
		DEWALD PART No.	CBS PART No.	SYLVANIA PART No.	
M2	1N60*		1N60	1N295	Detector (Pigtail)

* Some versions may use 1N295 or CK706A in this application.

MISCELLANEOUS

ITEM No.	PART NAME	DEWALD PART No.	NOTES
M3	Tuning Cap	C-219	2 Gang (Ant. 10-135mmf, Osc. 15-94mmf)
M4	Switch		Radio -Multi-Aid, 3PST, Slide Type
	Earphone	S-713	
	Remote Speaker	S-714	Includes Cabinet
	Cable & Plug Ass'y.	C-512	For Attaching Speaker
	Carrying Strap	H-466	

CABINETS & CABINET PARTS

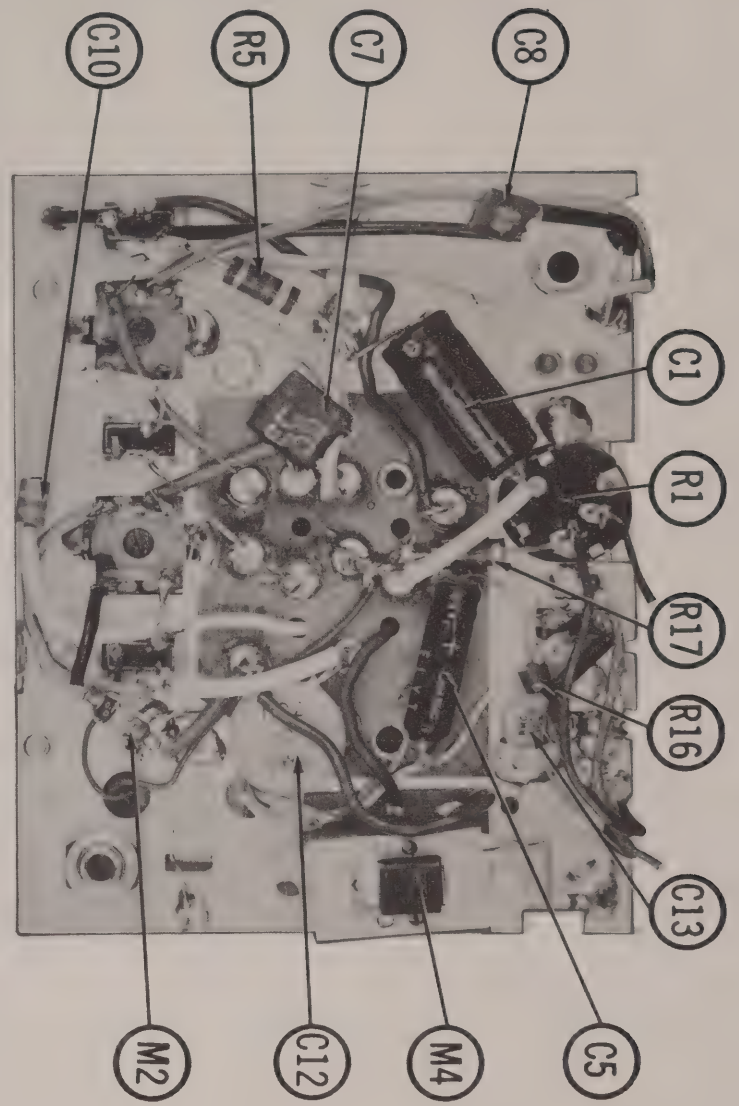
(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

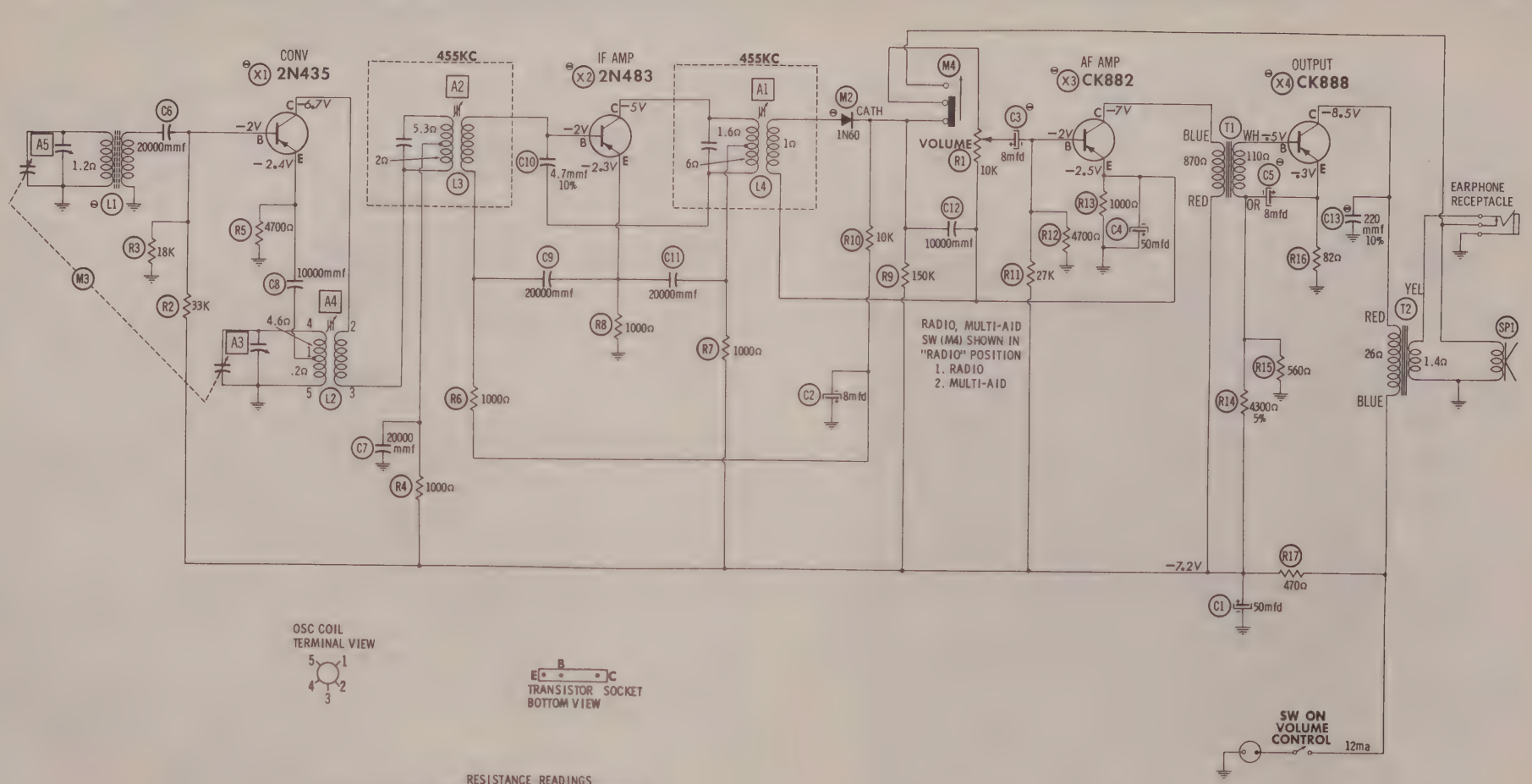
NAME	PART NO.	DESCRIPTION
Knob	K-464	Tuning
Knob	K-447	On-Off-Volume
Cabinet	C-445E	

WIRING DATA

General-use Unshielded Hook-up Wire .....Use BELDEN No. 8530 (Solid) Available in Ten Colors
8524 (Stranded) Available in Ten Colors

CHASSIS—BOTTOM VIEW





RESISTANCE READINGS

ITEM	TYPE	BASE	EMITTER	COLLECTOR
X1	2N435	12K	4700Ω	† 1500Ω
X2	2N483	11K	1000Ω	† 1500Ω
X3	CK882	3800Ω	1000Ω	† 1350Ω
X4	CK888	650Ω	82Ω	† 26Ω

TRANSISTORS REMOVED FOR RESISTANCE MEASUREMENTS.
† MEASURED FROM JUNCTION OF R17 AND T2.

1. DC voltage measurements taken with vacuum tube voltmeter.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.
5. Volume control at maximum, no signal applied for voltage measurements.

⊖ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

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EIA MEMBER ELECTRONIC INDUSTRIES ASSOCIATION

EMERSON MODEL 895B (Ch. 120431B)

EMERSON MODEL
895B (Ch. 120431B)

EMERSON MODEL
895B (Ch. 120431B)

TRADE NAME	Emerson Model 895B (Ch. 120431B)		
MANUFACTURER	Emerson Radio & Phono Corp., 14th & Coles Streets, Jersey City 2, N. J.		
TYPE SET	AC-DC FM-AM Receiver		
TUBES (Seven)	Types 12BA6 FM RF Amplifier, 12AT7 FM Mixer-FM Osc., 12BE6 AM Converter, 12BA6 1st FM-AM IF Amplifier, 12BA6 2nd FM IF Amp. - AM Det. - AVC, 19T8 Ratio Det. - AF Amp., 35C5 Output		
POWER SUPPLY	105-125 Volts AC-60 Cycles	RATING	.34 Amp. @ 117 Volts AC (30 Watts) FM
TUNING RANGE - BROADCAST	540 - 1620KC	FREQ. MOD.	88 - 108MC

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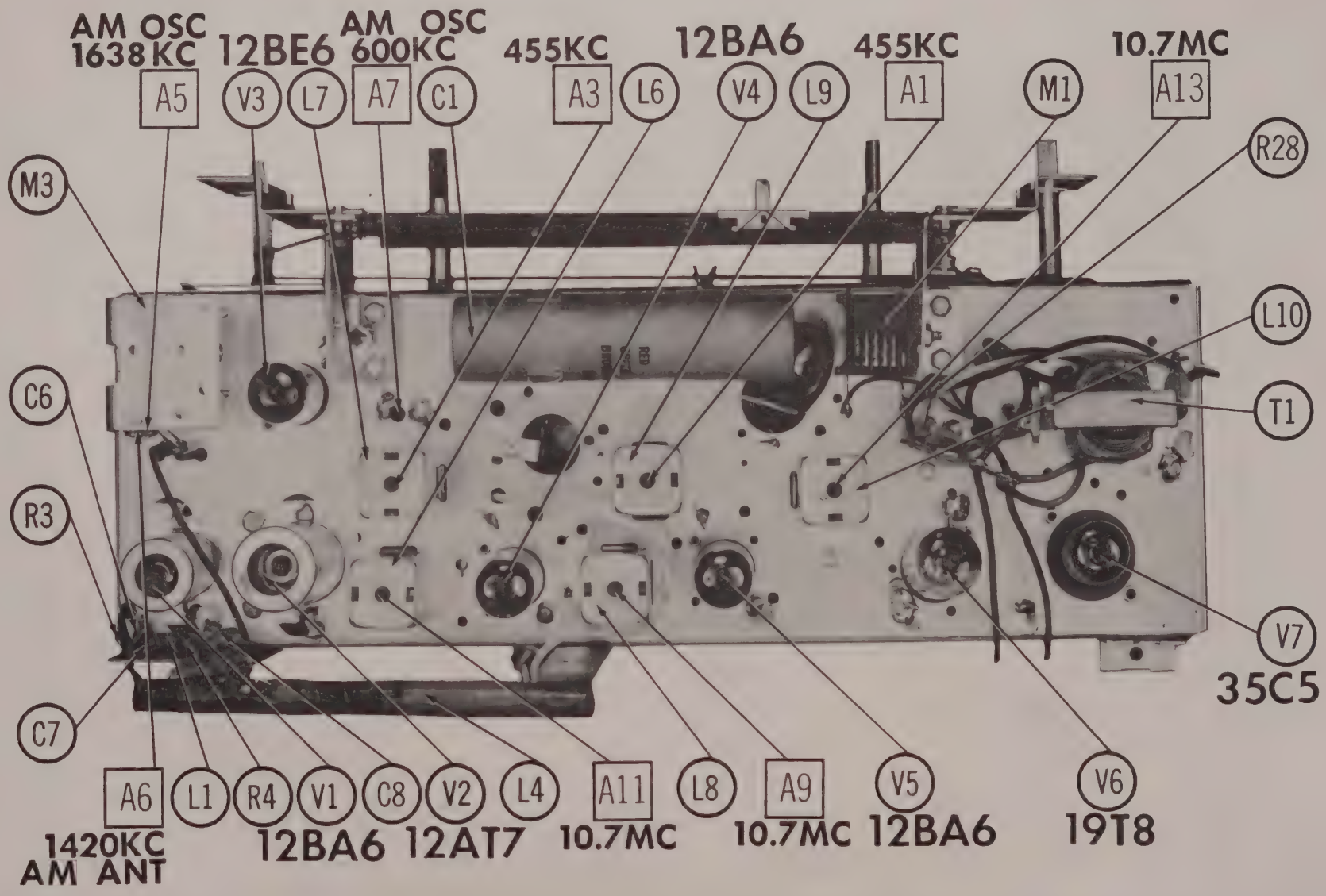
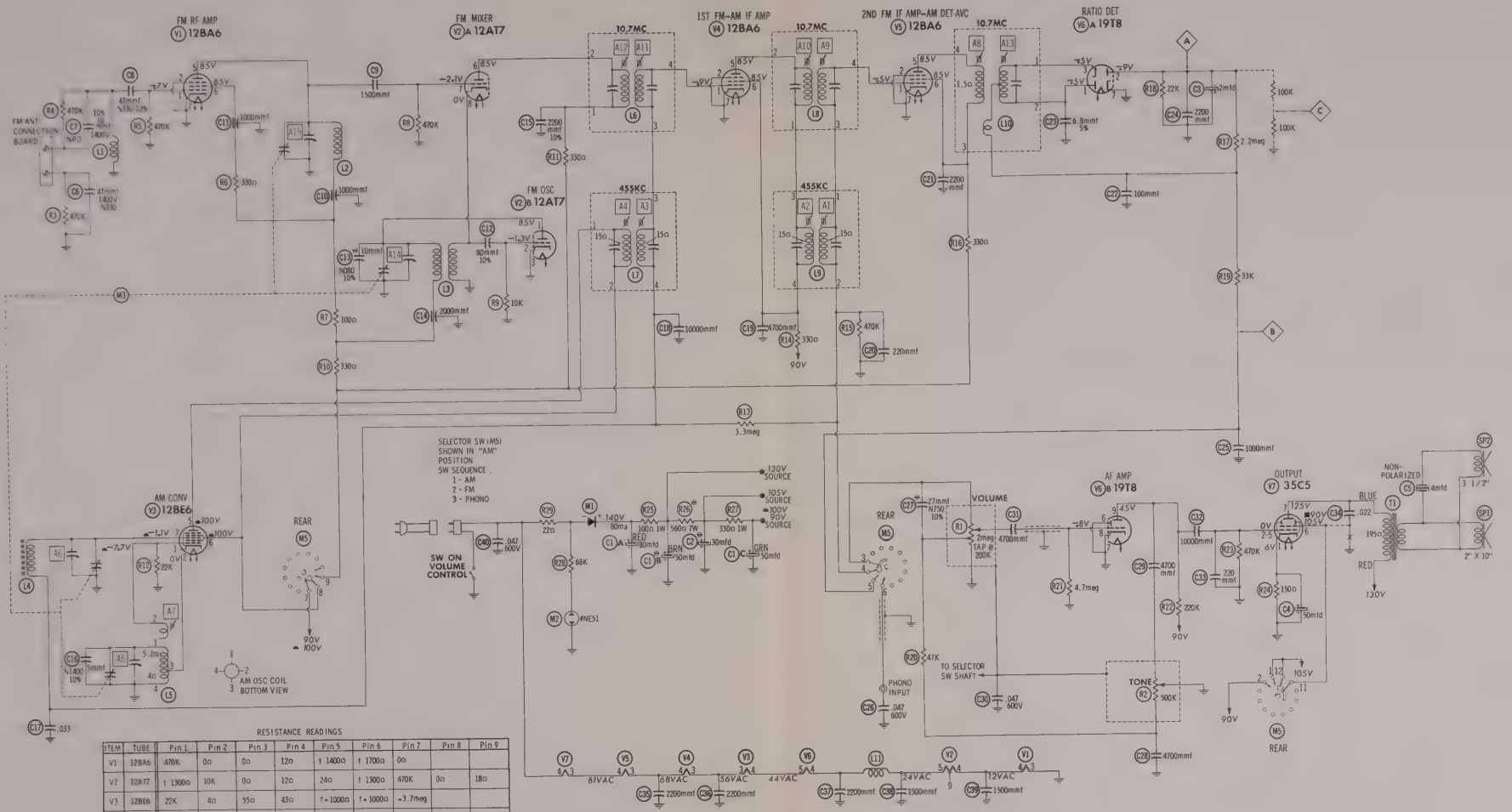
H724

DATE 12-58

SET 425 FOLDER 6



CHASSIS-TOP VIEW



RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	12BA6	470K	0Ω	0Ω	12Ω	↑ 1400Ω	↑ 1700Ω	0Ω		
V2	12AT7	↑ 1300Ω	10K	0Ω	12Ω	24Ω	↑ 1300Ω	470K	0Ω	18Ω
V3	12BE6	22K	4Ω	55Ω	43Ω	↑∞1000Ω	↑∞1000Ω	∞3.7meg		
V4	12BA6	3.7meg	0Ω	55Ω	67Ω	↑ 1300Ω	↑ 1300Ω	0Ω		
V5	12BA6	470K	0Ω	67Ω	79Ω	↑ 1300Ω	↑ 1300Ω	0Ω		
V6	19T8	850K	22K	850K	24Ω	43Ω	0Ω	0Ω	4.7meg	↑ 220K
V7	35C5	150Ω	470K	79Ω	110Ω	470K	↑ 660Ω	↑ 295Ω		

ALL MEASUREMENTS TAKEN IN "FM" POSITION UNLESS OTHERWISE DESIGNATED.
↑ MEASURED FROM OUTPUT OF M1
∞ MEASURED IN "AM" POSITION.
■ MEASURED IN PHONO POSITION

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

❶ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

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425-6

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT
Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting. Use isolation transformer, if available. If not, connect a .1mfd capacitor in series with low side of signal generator and B-.

AM ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.25mfd	High side to AM antenna stator lug of tuning gang. Low side to B-.	455KC (400∿ Mod.)	AM	Tuning gang fully open	Across voice coil	A1, A2, A3, A4	Adjust for maximum output.
2.		Loop	1638KC	"	"	"	A5	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
3.		"	1420KC	"	Tune to 1420KC signal	"	A6	"
4.		"	600KC	"	600KC	"	A7	Adjust for maximum output while rocking tuning gang. Repeat steps 2, 3, and 4.

FM IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

Connect two matched 100K (±1%) resistors in series from point Ⓐ to chassis. The junction of these two resistors is alignment point Ⓒ as shown on the schematic.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
5.		High side to ungrounded tube shield of 12AT7 (V2). Low side to B-.	10.7MC (Unmod.)	FM	Point of non-interference	DC probe to point Ⓐ. Common to B-.	A8, A9, A10, A11, A12	Adjust for maximum deflection.
6.		"	"	"	"	DC probe to point Ⓑ. Common to point Ⓒ.	A13	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.

FM IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60∿ modulation and 450KC sweep. Use 120∿ sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT SCOPE	ADJUST	REMARKS
5.		High side to ungrounded tube shield of 12AT7 (V2). Low side to B-.	10.7MC (450KC Swp)	FM	Point of non-interference	Vert. Amp. to point Ⓐ. Low side to B-.	A8, A9, A10, A11, A12	Disconnect stabilizing capacitor C3. Adjust for curve of maximum amplitude and symmetry similar to Fig. 1.
6.		"	"	"	"	Vert. Amp. to point Ⓑ. Low side to B-.	A13	Reconnect stabilizing capacitor C3. Adjust so that 10.7MC occurs at center of crossover lines similar to Fig. 2. SLIGHTLY retouch A8 for maximum amplitude and straightness of crossover lines.

FM RF ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
7.	Two 120Ω Carbon Resistors	FM antenna terminals with 120Ω in each side.	108MC (Unmod.)	FM	108MC	DC probe to point Ⓐ. Common to B-.	A14, A15	Adjust for maximum deflection.
8.	"	"	88MC	"	88MC	"	L3, L2	Adjust for maximum deflection by compressing or expanding coil turns. Do not alter spacing between L3 and Mixer Coupling Loop. Repeat steps 7 and 8.

FIG. 1

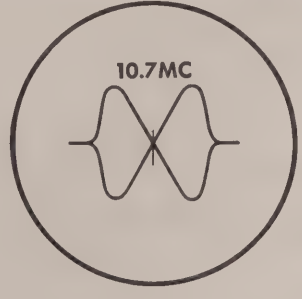
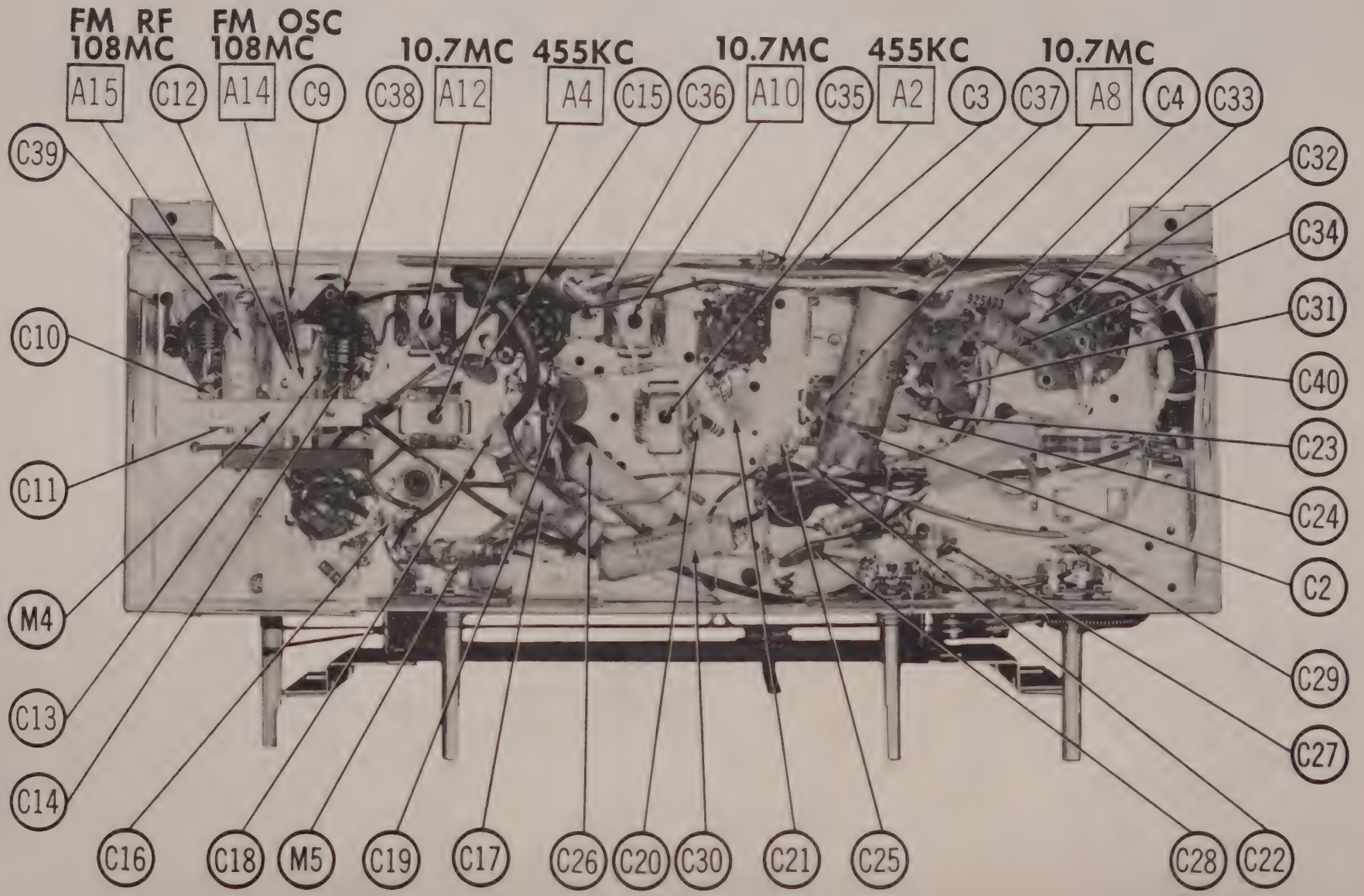


FIG. 2



CHASSIS BOTTOM VIEW - CAPACITOR, MISC, & ALIGN IDENT.

PARTS LIST AND DESCRIPTIONS

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE	NOTES
V1	FM RF Amplifier	12BA6	
V2	FM Mixer-FM Osc.	12AT7	
V3	AM Converter	12BE6	
V4	1st FM - AM IF Amp.	12BA6	

ITEM No.	USE	TYPE	NOTES
V5	2nd FM IF Amplifier AM Det. - AVC	12BA6	
V6	Ratio Det. - AF Amp.	19T8	
V7	Output	35C5	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING CAP.	RATING VOLT.	REPLACEMENT DATA EMERSON PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1A	80	150	925432		BBRD8515	TCT318		T-057	R2707 *
B	50	150	①		BR5015			MT-1530	
C	50	150							
C2	30	150	925447 ②	PRS150V30	BR3015	TC47	TD-30-150	MT-1530	TVA-1412
C3	2	50	925434	PRS50V2	BBR2-50	TC302	TD-2-50	MT-0502	TVA-1301
C4	50	25	925433	PRS25V50	BBR50-25	TT25X50	TD-50-25	MT-0250	TVA-1206
C5	4	15NP	925391	NP-PRS50V	BBR8-150 †	TC504	TD-8-150 †	MT-1508 †	R2444 *
					BBR8-150 †		TD-8-150 †	MT-1508 †	

* Not normally in distributors stock. Available through distributor on order from manufacturer.
① C1B may be single 30mfd in some versions. (Part #925447).
② May be part of C1 in some sets.
† Connect negative leads together.

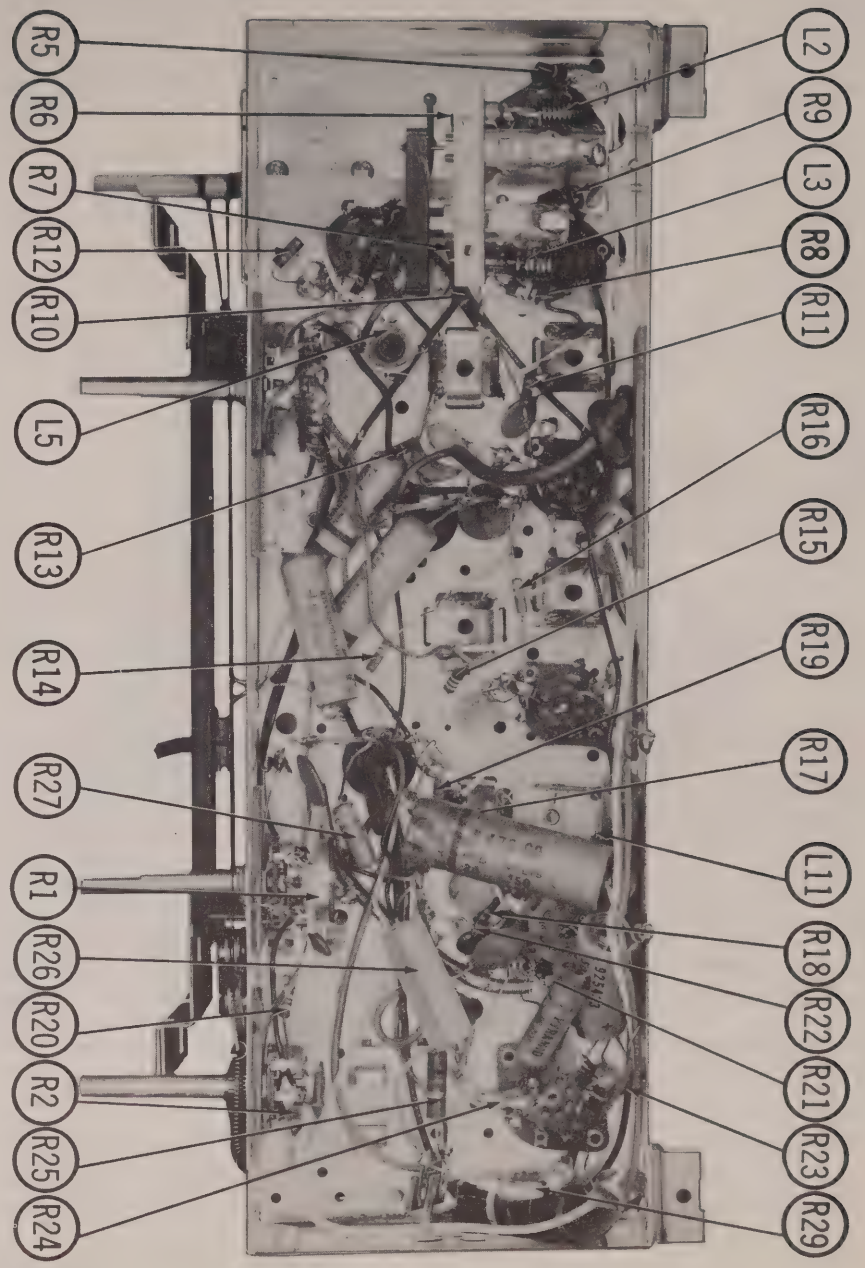
FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING CAP.	RATING VOLT	REPLACEMENT DATA EMERSON PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C6	47	1400	928969						N330
C7	10	1400	928968						NPO 10%
C8	47		928860						N330 10%
C9	1500			BPD-0015	DD-152	BYA10D15	DC5215	5HK-D15	
C10	1000		962227	EF-001	MFT-1000			503C-D1	
C11	1000		962227	EF-001	MFT-1000			503C-D1	
C12	80								10%
C13	10								N080 10% ①
C14	2000		962228						
C15	2200		928921			1R5D22		MS-222	10%
C16	5		928967						N1400 10%
C17	.033	400	923534	P488N-033	DF-303	CUB4S33	GEM-4133	6TM-S33	
C18	10000		928924	BPD-01	DD-103	BYA6S1	DC511	5HK-S1	
C19	4700		928922	BPD-0047	DD-472	BYA10D47	UC-5247	5HK-D47	
C20	220		928914	BPD-00022	DD-221	L10T22	UC-5322	5GA-T22	
C21	2200		928921	BPD-0022	DD-222	BYA10D22	UC-5222	5HK-D22	
C22	100		928912	BPD-0001	DD-101	L10T1	UC-531	5GA-T1	
C23	6.8		928802						5%
C24	2200		928921	BPD-0022	DD-222	BYA10D22	UC-5222	5HK-D22	
C25	1000		928919	BPD-001	DD-102	BYA6D1	DC521	5HK-D1	
C26	.047	600	923754	P688N-047	DF-503	CUB6S47	GEM-6147	6TM-S47	
C27	27								N750 10% ②
C28	4700		928922	BPD-0047	DD-472	BYA10D47	UC-5247	5HK-D47	
C29	4700		928922	BPD-0047	DD-472	BYA10D47	UC-5247	5HK-D47	
C30	.047	600	923754	P688N-047	DF-503	CUB6S47	GEM-6147	6TM-S47	
C31	4700		928922	BPD-0047	DD-472	BYA10D47	UC-5247	5HK-D47	
C32	10000		928924	BPD-01	DD-103	BYA6S1	DC511	5HK-S1	
C33	220		928914	BPD-00022	DD-221	L10T22	UC-5322	5GA-T22	
C34	.022	400	923524	P488N-022	DD-203	CUB4S22	GEM-4122	4TM-S22	
C35	2200		928921	BPD-0022	DD-222	BYA10D22	UC-5222	5HK-D22	
C36	2200		928921	BPD-0022	DD-222	BYA10D22	UC-5222	5HK-D22	
C37	2200		928921	BPD-0022	DD-222	BYA10D22	UC-5222	5HK-D22	
C38	1500			BPD-0015	DD-152	BYA10D15	DC5215	5HK-D15	
C39	1500			BPD-0015	DD-152	BYA10D15	DC5215	5HK-D15	
C40	.047	600	922208	P688N-047	DF-503	CUB6S47	GEM-6147	6TM-S47	

① Some versions use 9.5mmf N80 in this application (Part #962229).
② Some versions use 33mmf 10% in this application (Part #928894).

CHASSIS—BOTTOM VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	EMERSON PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1A	2meg	½	390537	B T-81	A47F4-2meg	Q17-139X	UT-448	Volume, Tap ⓐ 200K
B	Shaft			Not Req.	FS-3	Not Req.	Not Req.	
C	Switch			KB-1 or KR-1*	SWE-12	76-1	US-26	Power On-Off
R2A	500K	½	390538	B-59	A47-500K-S	Q11-133	U50	Tone
B	Shaft			Not Req.	FS-3	Not Req.	Not Req.	

* Use KR with CRL "Red Label" controls and KB with "Blue Label" controls.

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING		EMERSON PART No.	NOTES
	OHMS	WATT		
R3	470K		351132	
R4	470K		351132	
R5	470K		351132	
R6	330Ω		350372	
R7	100Ω			
R8	470K		351132	
R9	10K			
R10	330Ω		350372	
R11	330Ω		350372	
R12	22K		340812	
R13	3.3meg		351332	
R14	330Ω		350372	
R15	470K		351132	
R16	330Ω		350372	

ITEM No.	RATING		EMERSON PART No.	NOTES
	OHMS	WATT		
R17	2.2meg		351292	
R18	22K		340812	
R19	33K		340852	
R20	47K		350892	
R21	4.7meg		351372	
R22	220K		351052	
R23	470K		351132	
R24	150Ω		394207	Fuse Type
R25	100Ω	1	370252	
R26	560Ω	7(WW)		①
R27	330Ω	1	380372	
R28	68K		340932	
R29	22Ω		397121	Fuse Type

① Some versions use 470Ω 7W in this application (Part #394208).

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA					NOTES
		EMERSON PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No.	
L1	FM Ant. Coil	710034	19-1000	BC-561	4602		1 Microhenry
L2	FM RF Coil	‡					‡ Part of M4
L3	FM Osc. Coil	‡					‡ Part of M4
L4	Loop Stick	700134					
L5	AM Osc. Coil	716122					
L6	1st FM IF	720307	16-3487	FM-254	1463		
L7	1st AM IF	720075	16-6758	BC-352	12-C1	RF-1	
L8	2nd FM IF	720307	16-3487	FM-254	1463		
L9	2nd AM IF	720075	16-6758	BC-353	12-C2	RF-2	
L10	Ratio Det.	708341	17-3498	FM-255	1465		
L11	Fil. Choke	705029	19-1002	BC-563	4606		2.2 Microhenry

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA							NOTES
	PRI.	SEC.	EMERSON PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T1	2700Ω	6-8Ω	734164	Z1001 ①	A-2902①	AU-604 ①	A-3849 ①	24S64 ①	S-53X ①	① Drill new mounting hole.

SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	EMERSON PART No.	QUAM PART No.	
SP1	2" x 10"	PM	6-8Ω	180184		
SP2	3½"	PM	5-6Ω	180185		

SELENIUM RECTIFIER

ITEM No.	RATING	REPLACEMENT DATA				NOTES
	CURRENT (Measured)	EMERSON PART No.	FEDERAL PART No.	INTERNATIONAL PART No.	SARKES TARZIAN PART No.	
M1	.081A	817072	1235AH	T100 SD-92 ①	100A K200 ①	① Silicon Type

MISCELLANEOUS

ITEM No.	PART NAME	EMERSON PART No.	NOTES
M2	Lamp		#NE51, Neon Type
M3	Tuning Cap.	900175	4 Gang (AM Sections: Ant. 11-228mmf, Osc. 12-115mmf)
M4	FM Tuner Ass'y	471064	
M5	Switch	510133	Funcion, Rotary, Wafer Type

CABINETS & CABINET PARTS

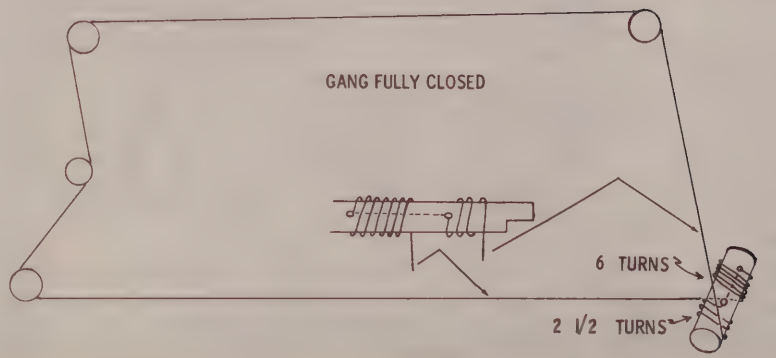
(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

NAME	PART NO.	DESCRIPTION
Knob	460999A	Tuning
Knob	460997A	On-Off-Volume, Tone
Knob	460998A	AM-FM-Phono

WIRING DATA

General-use Unshielded Hook-up Wire ..... Use BELDEN No. 8530 (Solid) Available in Ten Colors
8524 (Stranded) Available in Ten Colors

Power Cord (Interlock Type) ..... Use BELDEN No. 8874



DIAL CORD STRINGING

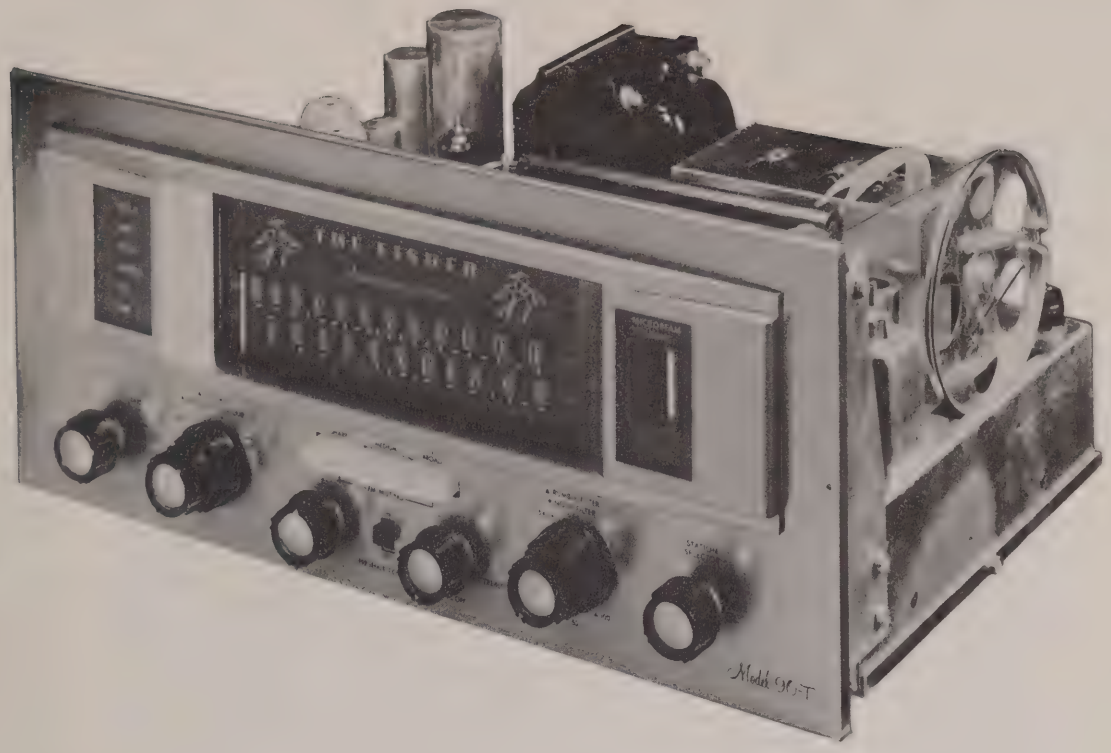
PHOTOFACT* Folder

*TRADE MARK

EIA MEMBER ELECTRONIC INDUSTRIES ASSOCIATION

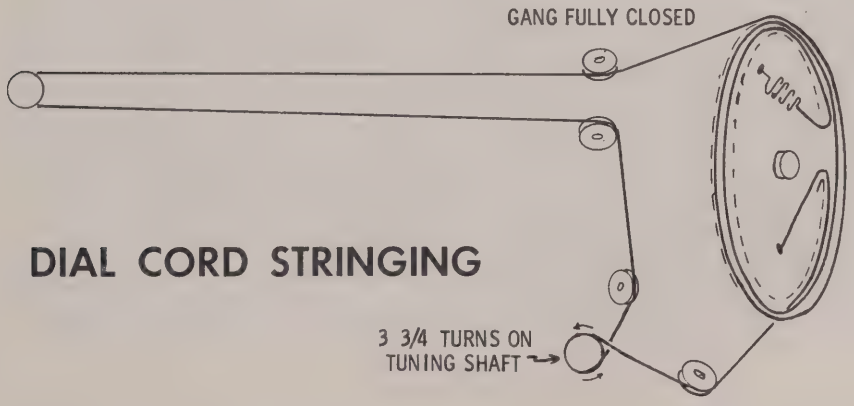
FISHER
MODEL 90-T

FISHER
MODEL 90-T



FISHER
MODEL 90-T

TRADE NAME	Fisher Model 90-T (Serial #19999 and Lower)		
MANUFACTURER	Fisher Radio Corp., 21-21 44th. Drive, Long Island City 1, N.Y.		
TYPE SET	AC Operated FM-AM Tuner		
TUBES	Fifteen		
POWER SUPPLY	105-125 Volts AC-60 Cycles	RATING	.53 Amp. @ 117 Volts AC (54 Watts)
TUNING RANGE-BROADCAST	535-1650KC	FREQ. MOD.	88-108MC



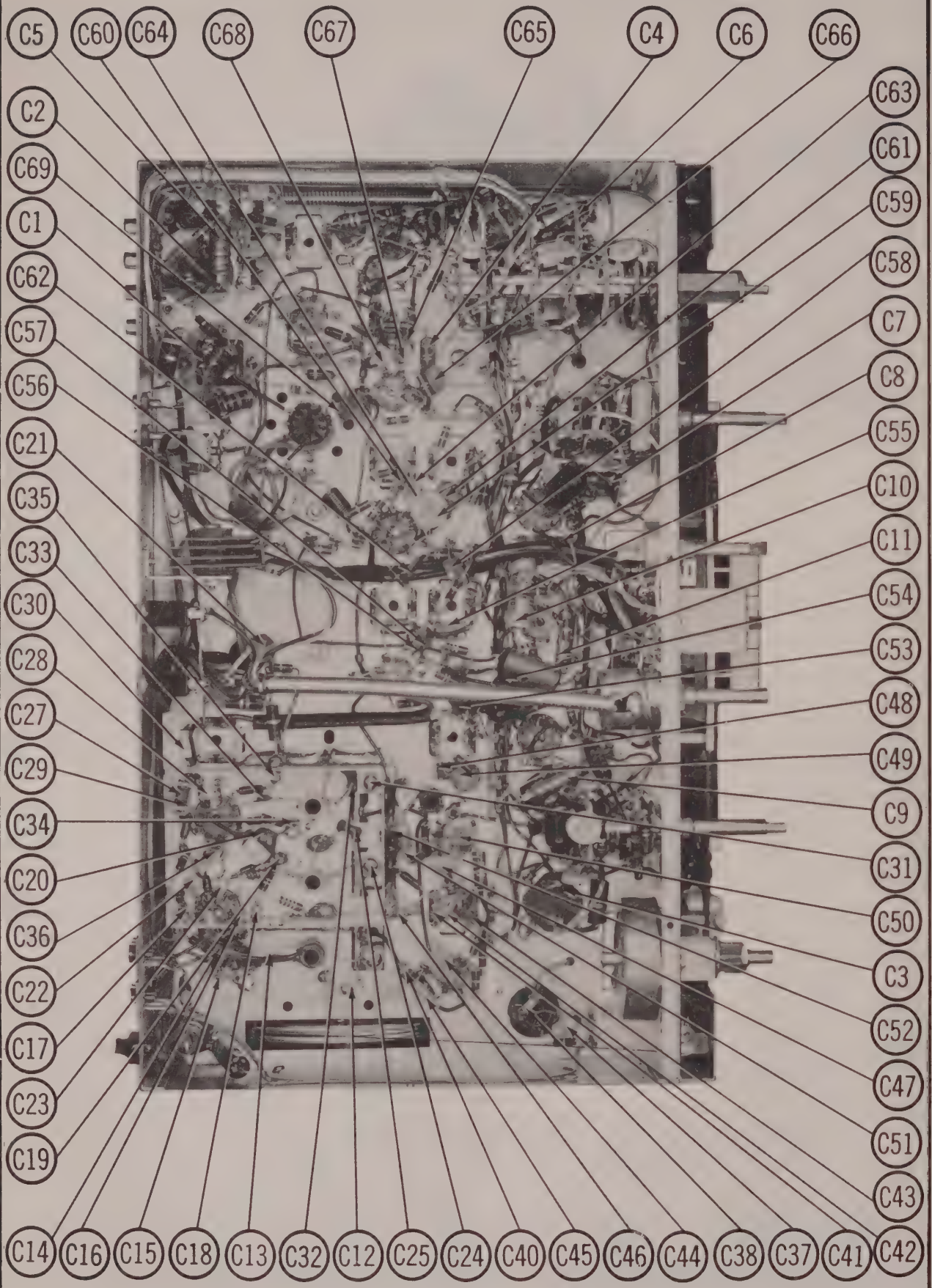
DIAL CORD STRINGING

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

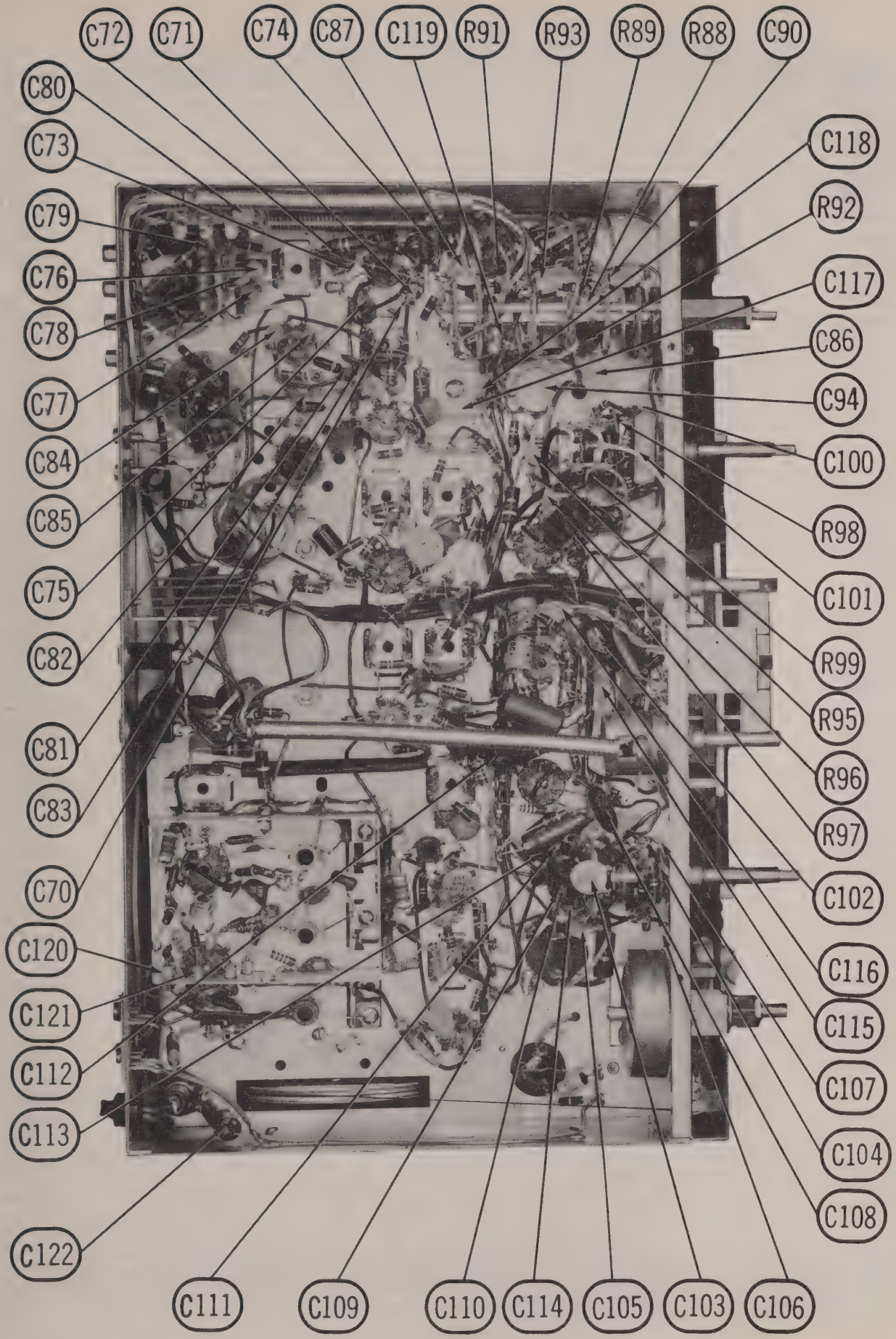
The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed. Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. © 1958 Howard W. Sams & Co., Inc., Indianapolis 6, Indiana Printed in U.S. of America

H718

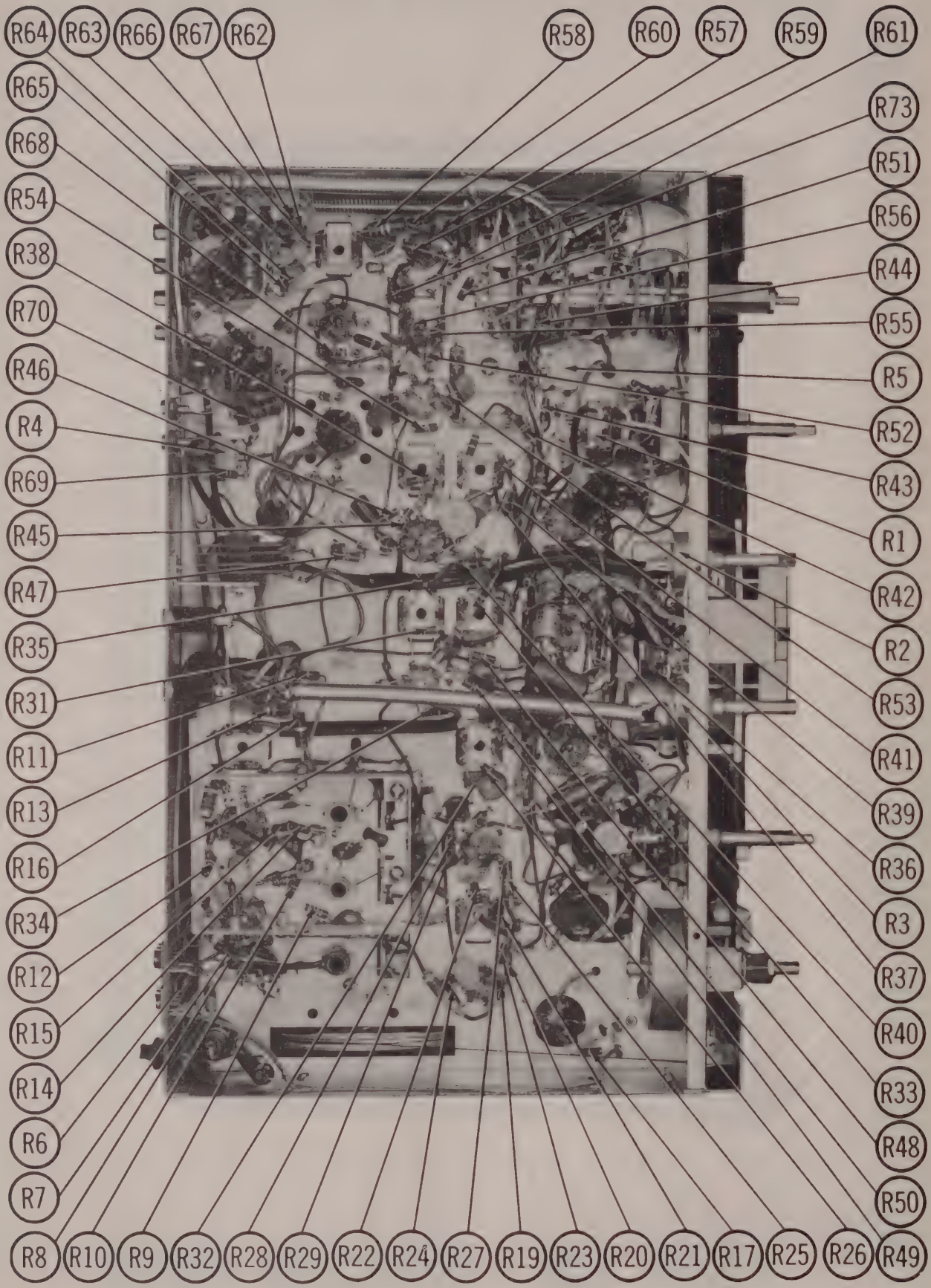
SET 425 FOLDER 7



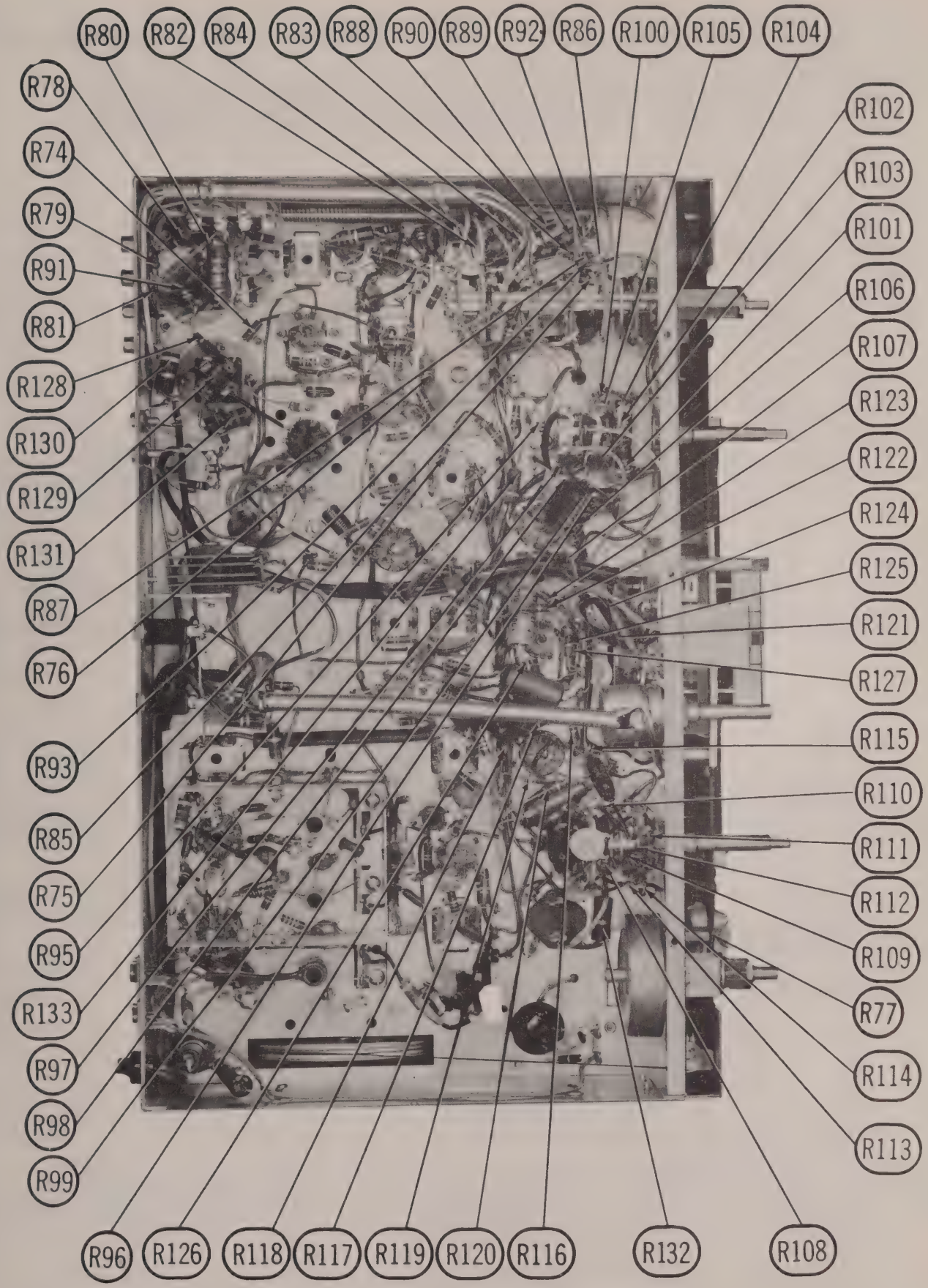
CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION



CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION



CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION



CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION

PARTS LIST AND DESCRIPTIONS

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE
V1	FM RF Amplifier	PCC88/V50067 ①
V2	FM Mixer-FM Osc.	6AQ8/ECC85 ①
V3	AM RF Amplifier	6BJ6
V4	AM Converter	6BE6
V5	1st FM-AM IF Amplifier	6BJ6
V6	2nd FM-AM IF Amp. - AM Det. -AM AVC	6BF89
V7	3rd FM IF Amplifier	6BH6
V8	4th FM IF Amplifier	6BH6
V9	Squelch-AVC Clamper	6AV6
V10	Tuning Indicator	EM840/V50078 ①
V11	Preamplifier	12AX7/ECC83 ①
V12	1st AF Amplifier	12AX7/ECC83 ①
V13	2nd AF Amplifier	6267/EF86 ①
V14	3rd AF Amplifier	6C4
V15	Rectifier	6V4/EZ80 ①

① Domestic type listed may not be directly interchangeable in some instances.

ELECTROLYTIC CAPACITORS

ITEM No.	RATING CAP.	RATING VOLT.	FISHER PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1A	▰40	300	C-629-126		D0034			Q-012	R2446 *
B	■40	300							
C	▲40	250							
D	40	250							
C2A	■40	250	C-629-143	AFH2-28	B0230	FP319.8	TMD-26	T-076	TVL-2519
B	▲20	250							
C3A	▲1000	25	C-629-144		A0130	WP201.15			R2619 *
B	▰1000	25			A0130				
C4	4	50	C-629-175	PRS150V4	BBR4-50	TT50X5	TD-4-50	MT-0504	TVA-1402
C5	8	50	C-629-138	PRS150V8	BBR8-150	TC41	TD-8-150	MT-1508	TVA-1405
C6	25	6	C-639-114	SRE6V25	BBR25-6	TT6X25	TD-25-25	MMT-625	TVA-1205
C7	25	6	C-639-114	SRE6V25	BBR25-6	TT6X25	TD-25-25	MMT-625	TVA-1205
C8	25	6	C-639-114	SRE6V25	BBR25-6	TT6X25	TD-25-25	MMT-625	TVA-1205
C9	25	6	C-639-114	SRE6V25	BBR25-6	TT6X25	TD-25-25	MMT-625	TVA-1205
C10	1.0	250	C-546-126	PRS450V1	BR145	TT250X1		MMT-4501	R2702 *
C11	25	6	C-639-114	SRE6V25	BBR25-6	TT6X25	TD-25-25	MMT-625	TVA-1205

* Not normally in distributors' stock. Available through distributor on order to manufacturer

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING CAP.	RATING VOLT	FISHER PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C12	5		CC20CH050P5	NPO-SI 5	TCZ-4R7	CTA6V47C	ZT-555	5TCCB-V47	NPO
C13	100	1000	C-50070-5	"	"	"	"	"	N1500
C14	100	1000	C-50070-5	"	"	"	"	"	N1500
C15	1000	1000	C-50071-2	BPD-001	DD-102	BYA6D1	DC3021	5HK-D1	
C16	1000		C-629-172	EF-001	MFT-1000			503C-D1	
C17	1000		C-629-172	EF-001	MFT-1000			503C-D1	
C18	1000		C-629-172	EF-001	MFT-1000			503C-D1	
C19	1000		C-629-172	EF-001	MFT-1000			503C-D1	
C20	5000		C-629-170	BPD-005	DD-502	BYA10D5	DC525	5HK-D5	
C21	5000		C-629-170	BPD-005	DD-502	BYA10D5	DC525	5HK-D5	
C22	1000	1000	C-50071-2	HVD-15-1000	DD-102	BYA6D1	DC3021	5HK-D1	
C23	1000	1000	C-50071-2	HVD-15-1000	DD-102	BYA6D1	DC3021	5HK-D1	
C24			C-643-153						①
C25	3		CC20CH030D5	NPO-SI 3			ZT-553		NPO ②
C26	68		CC21GP680K5	NPO-SI 68	D6-680	CTA6Q68C		5TCC-Q68	10%
C27	120		CC21GP121K5	NPO-SI 120	D6-121	CTA6T12C		5TCC-T12	10%
C28	5		CC20CH050F5	NPO-SI 5	TCZ-4R7	CTA6V47C	ZT-555	5TCCB-V47	NPO
C29	24		CC21GP240K5	NPO-SI 24		CTA6Q24C			10%
C30	1000		CC21GP102K5						
C31			C-643-153						①
C32	15		CC20TJ150J5						N470 ③
C33	100		C-577-121	BPD-0001	DD-101	L10T1	UC-531	5GA-T1	
C34	100		C-577-121	BPD-0001	DD-101	L10T1	UC-531	5GA-T1	
C35	1000		C-629-172	EF-001	MFT-1000			503C-D1	
C36	1000		C-50071-2	BPD-001	DD-102	BYA6D1	DC3021	5HK-D1	

CAPACITORS (cont)

ITEM No.	RATING CAP.	RATING VOLT	FISHER PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C37	24		CC21GP240K5	NPO-SI 24		CTA6Q24C			10%
C38	5		CC20CH050P5	NPO-SI 5	TCZ-4R7	CTA6V47C	ZT-555	5TCCB-V47	NPO ④
C39	4-40		C-629-151-2						
C40	120		CC21GP121K5	NPO-SI 120	D6-121	CTA6T12C		5TCC-T12	10%
C41	.68		C-50077-6N	NPO-SI .68	TCZ-R68				
C42	47	1000	C-50070-4	N750-DI 47	DTN-47	C10Q47U		5TCU-Q47	N750 10%
C43	5000		C-629-170	BPD-005	DD-502	BYA10D5	DC525	5HK-D5	
C44	20000		C-50071-3	BPD-02	DD-203	BYB6S2		5HK-S2	
C45	20000		C-50071-3	BPD-02	DD-203	BYB6S2		5HK-S2	
C46	10		CC20CH100G5	NPO-SI 10	TCZ-10	CTA6Q1C	ZT-541	5TCC-Q1	NPO
C47	100	1000	C-50070-2						N1500
C48	470		C-3334	1469-00047	MD-471	5R5T47		MS-347	5%
C49	5000		C-629-170	BPD-005	DD-502	BYA10D5	DC525	5HK-D5	
C50	20000		C-50071-3	BPD-02	DD-203	BYB6S2		5HK-S2	
C51	120		CC21GP121K5	NPO-SI 120	D6-121	CTA6T12C		5TCC-T12	10%
C52	10		CC20VK100G5						N1400
C53	470		C-3334	1469-00047	MD-471	5R5T47		MS-347	5%
C54	.047	250	C-50074-27						10%
C55	470		C-3334	1469-00047	MD-471	5R5T47		MS-347	5%
C56	5000		C-629-170	BPD-005	DD-502	BYA10D5	DC525	5HK-D5	
C57	5000		C-629-170	BPD-005	DD-502	BYA10D5	DC525	5HK-D5	
C58	470		C-3334	1469-00047	MD-471	5R5T47		MS-347	5%
C59	20000		C-50071-3	BPD-02	D6-203	BYB6S2		5HK-S2	
C60	10		CC20CH100G5	NPO-SI 10	TCZ-10	CTA6Q1C	ZT-541	5TCC-Q1	NPO
C61	5000		C-629-170	BPD-005	DD-502	BYA10D5	DC525	5HK-D5	
C62	5000		C-629-170	BPD-005	DD-502	BYA10D5	DC525	5HK-D5	
C63	1.0	1000	C-50070-1						P100
C64	220		CC21GP221K5	NPO-SI 220	D6-221	L10T22		5TCC-T22	
C65	5000		C-629-170	BPD-005	DD-502	BYA10D5	DC525	5HK-D5	
C66	5000		C-629-170	BPD-005	DD-502	BYA10D5	DC525	5HK-D5	
C67	100	1000	C-50070-5						N1500
C68	100	1000	C-50070-5						N1500
C69	5000		C-629-170	BPD-005	DD-502	BYA10D5	DC525	5HK-D5	
C70	5		CC20CH050F5	NPO-SI 5	TCZ-4R7	CTA6V47C	ZT-555	5TCCB-V47	NPO
C71	5		CC20CH050F5	NPO-SI 5	TCZ-4R7	CTA6V47C	ZT-555	5TCCB-V47	NPO
C72	5000		C-629-170	BPD-005	DD-502	BYA10D5	DC525	5HK-D5	
C73	5000		C-629-170	BPD-005	DD-502	BYA10D5	DC525	5HK-D5	
C74	5000		C-629-170	BPD-005	DD-502	BYA10D5	DC525	5HK-D5	
C75	5000		C-629-170	BPD-005	DD-502	BYA10D5	DC525	5HK-D5	
C76	330	1000	C-50072-1		MD-331	L10T33			10%
C77	330	1000	C-50072-1		MD-331	L10T33			10%
C78	330	1000	C-50072-1		MD-331	L10T33			10%
C79	1000	1000	C-50071-2		DD-102	L10D1		5HK-D1	
C80	1000	1000	C-50072-3						10%
C81	1000	1000	C-50071-2		DD-102	L10D1		5HK-D1	
C82	1000	1000	C-50071-2		DD-102	L10D1		5HK-D1	
C83	5000		C-629-170	BPD-005	DD-502	BYA10D5	DC525	5HK-D5	
C84	1000	1000	C-50071-2		DD-102	L10D1		5HK-D1	
C85	1000	1000	C-50071-2		DD-102	L10D1		5HK-D1	
C86	20000		C-50071-3	BPD-02	DD-203	BYB6S2		5HK-S2	
C87	50000		C-50073-2	BPD-05	DF-503	BYA10S5		5HK-S5	
C88	390	1000	C-50072-6		MD-391	L10T39			10%
C89	820	1000	C-50072-7						10%
C90	1800	1000	C-50072-8						10%
C91	5000		C-629-170	BPD-005	DD-502	BYA10D5	DC525	5HK-D5	
C92	.022	250	C-50074-26						10%
C93	50000		C-50073-2	BPD-05	DF-503			5HK-S5	
C94	50000		C-50073-2	BPD-05	DF-503			5HK-S5	
C95	30	1000	C-50070-3						N150 10%
C96	20000		C-50073-1	BPD-02	DD-203	BYB6S2		5HK-S2	
C97	.1	250	C-50074-28						5%
C98	220		CC21GP221K5	NPO-SI 220	D6-221	L10T22		5TCC-T22	10%
C99	120		CC21GP121K5	NPO-SI 120	D6-121	L10T12		5TCC-T12	10%
C100	.0047	200	C-50074-24				GEM-16247		10%
C101	.0047	200	C-50074-24				GEM-16247		10%
C102	.1	250	C-50074-28						5%
C103	1200	1000	C-50072-4						10%
C104	680	1000	C-50070-2		MD-681				10%
C105	1200	1000	C-50072-4						10%
C106	680	1000	C-50072-2		MD-681				10%
C107	12	1000	C-50070-2						NPO 10%
C108	.027	125	C-50074-16						NPO⑤

PARTS LIST AND DESCRIPTIONS (Continued)

CAPACITORS (cont)

ITEM No.	RATING CAP.	RATING VOLT	REPLACEMENT DATA FISHER PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C109	.1	250	C-50074-28						5%
C110	.01	250	C-50074-25				GEM-1611		10%
C111	.0047	200	C-50074-24				GEM-16247		10%
C112	.047	250	C-50047-27						10%
C113	.1	250	C-50074-28	P488N-1	DF-104	CUB4P1	GEM-401	4TM-P1	
C114	12	1000	C-50070-2						NPO 10%
C115	2200	1000	C-50072-5						10%
C116	20000		C-50073-1	BPD-02	DD-203	BYB6S1		5HK-S2	
C117	12-100		C-629-151-2						
C118	30	1000	C-50073-3						N150 10%
C119	47		CC21GP470K5	NPO-SI 47	D6-470	L10Q47		5TCC-Q47	10%
C120	1000		C-629-172	EF-001	MFT-1000			503C-D1	
C121	1000		C-629-172	EF-001	MFT-1000			503C-D1	
C122	.01	600	C-2747	P688N-01	D6-103	CUB6S1	GEM-611	6TM-S1	

① Some versions may use Part #C-520-159 in this application.
② Some versions may use 5mmf in this application (Part #CC20CH050F5).
③ Some versions may use 18mmf N330 5% in this application (Part #CC20SJ180J5).
④ Not used in some versions.
⑤ Some versions may use two units in parallel. Other versions use .0047mfd (Part #C-50074-24), or .022mfd (Part #C-50074-26).

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA FISHER PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	Switch		R629-123					Loudness Contour
B	500K	½						Volume, Taps ⓐ 150K
C	100K	½						Volume & 300K
R2A	1meg	½	R629-117	B-69	A47-1meg-S	Q11-137	U54	Bass
B	Shaft			Not Req.	FS-3	Not Req.	Not Req.	
R3A	500K	½	R629-116	BT-65			UT431	Treble, Tap ⓐ 250K
B	Switch			KB-2 or KR-2*			US-27	Power On-Off
R4A	50K	½	R629-141-1	JP-503	A47-50K-S††	Q11-123 ††	U35 ††	Muting Adj.
B	Shaft			Not Req.	FKS-1/4	RQ	Not Req.	
R5A	200K	½	R629-141-2	JP-254				10KC Filter Adj.

* Use KR with CRL "red label" control; KB with "blue label" controls and KB-5 switch cover.
†† Enlarge mounting hole to 3/8" diameter.

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING OHMS	RATING WATT	FISHER PART No.	NOTES
R6	220Ω		RC20BF221K	
R7	470K		RC20BF474K	
R8	100Ω		RC20BF101K	
R9	330K		RC20BF334K	
R10	330K		RC20BF334K	
R11	1000Ω		RC20BF102K	
R12	820K		RC20BF824K	
R13	10K	1	RC30BF103K	
R14	1500Ω		RC20BF152K	
R15	4.7Ω		RC20BF4R7K	
R16	6800Ω	1	RC30BF682K	
R17	1000Ω		RC20BF102K	
R18	4.7Ω		RC20BF4R7K	
R19	1meg		RC20BF105K	
R20	2.2meg		RC20BF225K	
R21	2200Ω		RC20BF222K	
R22	4.7Ω		RC20BF4R7K	
R23	47K		RC20BF473K	
R24	100Ω		RC20BF101K	
R25	820K		RC20BF824K	
R26	1000Ω		RC20BF102K	
R27	22K	1	RC30BF223K	
R28	22K		RC20BF223K	

ITEM No.	RATING OHMS	RATING WATT	FISHER PART No.	NOTES
R29	100Ω		RC20BF101K	Note 1
R30	100Ω		RC20BF101K	
R31	82K		RC20BF823K	
R32	82K		RC20BF823K	
R33	1000Ω		RC20BF102K	
R34	100Ω		RC20BF101K	
R35	10Ω		RC20BF100K	
R36	100Ω		RC20BF101K	
R37	2.2meg		RC20BF225K	
R38	82K		RC20BF823K	
R39	1000Ω		RC20BF102K	
R40	82K		RC20BF823K	
R41	56K		RC20BF563K	
R42	22K		RC20BF223K	
R43	100K		RC20BF104K	
R44	100K		RC20BF104K	Note 2
R45	820K		RC20BF824K	
R46	2.2meg		RC20BF225K	
R47	100K		RC20BF104K	
R48	22meg		RC20BF226K	
R49	330K		RC20BF334K	
R50	68K		RC20BF683K	
R51	1000Ω		RC20BF102K	

RESISTORS (cont)

ITEM No.	RATING OHMS	RATING WATT	FISHER PART No.	NOTES
R52	68K		RC20BF683K	Note 3
R53	22meg		RC20BF226K	
R54	100Ω		RC20BF101K	
R55	22K		RC20BF223K	
R56	470K		RC20BF474K	
R57	470K		RC20BF474K	
R58	18K	1	RC30BF183K	
R59	1500Ω		RC20BF152K	
R60	18K		RC20BF183K	
R61	2700Ω		RC20BF272K	
R62	1500Ω		RC20BF152K	
R63	6800Ω		RC20BF682K	Note 4
R64	1000Ω		RC20BF102K	
R65	6800Ω		RC20BF682K	Note 4
R66	270Ω		RC20BF271K	
R67	68K		RC20BF683K	
R68	470K		RC20BF474K	
R69	10K		RC20BF103K	
R70	220K		RC20BF224K	
R71	12K		RC20BF123K	
R72	18K		RC20BF183K	
R73	100K		RC20BF104K	
R74	10meg		RC20BF106K	Note 5
R75	3.3meg		RC20BF335K	
R76	220K		RC20BF224K	
R77	470K		RC20BF474K	
R78	1000Ω		RC20BF102K	
R79	47K		RC20BF473K	
R80	1000Ω		RC20BF102K	
R81	100K		RC20BF104K	
R82	330K		RC20BF334K	
R83	220K	1	RC30BF224K	
R84	2700Ω	1	RC30BF272K	
R85	1.2meg		RC20BF125K	
R86	3.3meg		RC20BF335K	
R87	39K		RC20BF393K	
R88	270K		RC20BF274K	
R89	2.2meg		RC20BF225K	
R90	220K		RC20BF224K	
R91	270K		RC20BF274K	
R92	2700Ω		RC20BF272K	

ITEM No.	RATING OHMS	RATING WATT	FISHER PART No.	NOTES
R93	150K		RC20BF154K	Note 6
R94	330K		RC20BF334K	
R95	330K		RC20BF334K	
R96	1meg		RC20BF105K	
R97	1meg		RC20BF105K	
R98	100K		RC20BF104K	
R99	1000Ω		RC20BF102K	
R100	47K		RC20BF473K	
R101	47K		RC20BF473K	
R102	68K		RC20BF683K	
R103	47K		RC20BF473K	
R104	47K		RC20BF473K	
R105	68K		RC20BF683K	
R106	100K		RC20BF104K	
R107	1500Ω		RC20BF152K	
R108	47K		RC20BF473K	
R109	47K		RC20BF473K	
R110	680K		RC20BF684K	
R111	10meg		RC20BF106K	
R112	10meg		RC20BF106K	
R113	10meg		RC20BF106K	
R114	10meg		RC20BF106K	
R115	820K		RC20BF824K	
R116	220K		RC20BF224K	
R117	2.2meg		RC20BF225K	
R118	100K		RC20BF104K	
R119	390K		RC20BF394K	
R120	1000Ω		RC20BF102K	
R121	33K		RC20BF333K	
R122	1meg		RC20BF105K	
R123	150K		RC20BF154K	
R124	100K		RC20BF104K	
R125	1meg		RC20BF105K	
R126	47K	1	RC30BF473K	
R127	1200Ω		RC20BF122K	
R128	2700Ω		RC20BF272K	
R129	2700Ω		RC20BF272K	
R130	390Ω	2	RC20BF391K	
R131	270Ω	2	RC40BF271K	
R132	12Ω 5%	2	RC40BF120J	
R133	240Ω 5%	1	RC30BF24LJ	

Note 1. Not used in some versions.
Note 2. Some versions may use 100Ω in this application (Part #RC20BF101K).
Note 3. Some versions may use 56K in this application (Part #RC20BF563K).
Note 4. Some versions may use 68K in this application (Part #RC20BF683K).
Note 5. Some versions may use 15meg in this application (Part #RC20BF156K).
Note 6. Some versions may use 180K in this application (Part #RC20BF184K).

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA FISHER PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No.	NOTES
L1	FM Ant. Coil	L-50066-8					3.3 Microhenries
L2	FM Ant. Trans.	L-629-177					
L3	RF Choke	L-50066-3	19-1000	BC-561	4602		1.2 Microhenries
L4	Fil. Choke	L-50066-19					.56 Microhenry
L5	RF Choke	L-50066-19					.56 Microhenry
L6	RF Choke	L-50066-19					.56 Microhenry
L7	RF Choke	L-629-180					Wound on 100Ω resistor
L8	FM RF Coil	L-629-178					
L9	RF Choke	L-50066-3	19-1000	BC-561	4602		1.2 Microhenries
L10	Fil. Choke	L-50066-19					.56 Microhenry
L11	FM Osc. Coil	L6-629-179					
L12	RF Choke	L-50066-3	19-1000	BC-561	4602		1.2 Microhenries
L13	AM Ant. Trans.	L-629-171					
L14	Loop Stick	L-629-176					
L15	RF Choke	L-50066-3	19-1000	BC-561	4602		1.2 Microhenries

PARTS LIST AND DESCRIPTIONS (Continued)

COILS (cont)

ITEM No.	USE	REPLACEMENT DATA					
		FISHER PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No.	NOTES
L16	RF Choke	L-50066-3	19-1000	BC-561	4602		1.2 Microhenries
L17	AM RF Trans.	L-556-125					
L18	RF Choke	L-50066-3	19-1000	BC-561	4602		1.2 Microhenries
L19	AM Osc. Coil	C-550-122					
L20	RF Choke	L-50066-3	19-1000	BC-561	4602		1.2 Microhenries
L21	1st FM IF	ZZ-630-114					
L22	1st AM IF	ZZ-629-135					
L23	2nd FM IF	ZZ-629-142	16-3487	FM-254	1463		
L24	2nd AM IF	ZZ-629-135					
L25	Fil. Choke	L-520-156	19-1000	BC-561	4602		1.2 Microhenries
L26	3rd FM IF	ZZ-629-142	16-3487	FM-254	1463		
L27	3rd AM IF	ZZ-2984	16-6758	BC-353	12-C2	RF-2	
L28	FM Limiter	L-551-121					
L29	Ratio Det.	ZZ-592-170					
L30	Tone Choke	L-629-153					

IOKC CHOKE

ITEM No.	RATINGS			REPLACEMENT DATA						
	CURRENT (Measured)	DC RES.	INDUCTANCE (0 CURRENT 1000 ~)	FISHER PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
L31		360Ω	2.3 Hy.	L-629-152						

TRANSFORMER (POWER)

ITEM No.	RATING			REPLACEMENT DATA						
	PRI.	SEC. 1	SEC. 2	FISHER PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117V @ .53A	420VCT @ .040A	7V @ .15A tap @ 6.3V @ 3.5A	T-629-118						
	SEC. 3	SEC. 4								
	20V @ .4A									

COMPONENT COMBINATIONS

ITEM No.	USE	DESCRIPTION	FISHER PART No.	REPLACEMENT DATA
K1	Tone Compensation		PC-552-105	

SELENIUM RECTIFIER

ITEM No.	RATING	REPLACEMENT DATA				NOTES
	CURRENT (Measured)	FISHER PART No.	FEDERAL PART No.	INTERNATIONAL PART No.	SARKES TARZIAN PART No.	
M1	.355A	SR-629-157	1017	C1B	604B	

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			FISHER PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M2	3AG	1A 250V	F-3329		312001. (1A 250V)	342001	AGC 1	HKP

CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA			NOTES
		FISHER PART No.	CBS PART No.	SYLVANIA PART No.	
M3	1N295	V-1N295	1N636	1N295	FM Limiter (Pigtail)
M4	1N295	V-1N295	1N636	1N295	FM Limiter (Pigtail)
M5	1N541 *	V-1N541	1N636	1N295	FM Muting (Pigtail)
M6	1N541 *	V-1N541	1N636	1N295	FM Muting (Pigtail)
M7	1N542	V-1N542	1N636	1N295	FM Detector (Pigtail)
M8	1N542	V-1N542	1N636	1N295	FM Detector (Pigtail)

* Some versions may use 1N66 in this application.

MISCELLANEOUS

ITEM No.	PART NAME	FISHER PART No.	NOTES
M9	Lamp	1-563-145	6V 2W
M10	Lamp	1-563-145	6V 2W
M11	Lamp	1-588-120	6.3 Volts .15A Special
M12	Lamp	1-588-120	6.3 Volts .15A Special
M13	Lamp	1-588-120	6.3 Volts .15A Special
M14	Lamp	1-588-120	6.3 Volts .15A Special
M15	Lamp	1-588-120	6.3 Volts .15A Special
M16	Lamp	1-588-120	6.3 Volts .15A Special
M17	Tuning Cap.	C-628-118	6 Gang ,(AM Section: Ant. 19-493mmf, RF 20-489mmf, Osc. 18-165mmf
M18	Switch	S-629-134	Channel Selector, Rotary, Wafer Type
M19	Switch	S-629-140	Noise, Rumble Filter, Rotary Wafer Type
M20	Switch	S-628-117	Muting, Bandwidth, Pushbutton, Slide Type
	Switch	S-629-117	Muting, Bandwidth, Pushbutton, Slide Type (Early units) Interchangeable with Switch #S-629-129
M21	Switch	S-629-155	Presence, SPST, Slide Type
M22	Switch	S-629-156	AM Antenna-Loop, SPDT, Slide Type

CABINETS & CABINET PARTS

(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

NAME	PART NO.	DESCRIPTION
Knob	E-50049-1	Tuning
Knob	E-50049-2	Volume
Knob	E-50049-12	Channel Selector, Bass, Treble
Knob	E-50049-4	Loudness, Noise Filter
Knob	E-50049-13	Rumble Filter
Panel	AS-629-162	Assembled, Includes Escutcheon
Panel	AS-629-115	Without Escutcheon
Pointer	A-629-154	
Dial Glass	A-629-133	

WIRING DATA

General-use Unshielded Hook-up Wire ..... Use BELDEN No. 8530 (Solid) Available in Ten Colors
8524 (Stranded) Available in Ten Colors

Power Cord ..... Use BELDEN No. 1765-B (6 Ft. Length)
1725-K (7½ Ft. Length)

CHASSIS TOP VIEW

FISHER
MODEL 90-T

RESISTANCE MEASUREMENTS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	PCC88 V50067	INF	950K	100Ω	.3Ω	0Ω	† 1600Ω	† 160K	INF	0Ω
V2	6AQ8 ECC85	† 7400Ω	1500Ω	0Ω	0Ω	.2Ω	† 10K	820K	0Ω	0Ω
V3	6BJ6	▲ 800K	100Ω	0Ω	.1Ω	▲ † 2800Ω	▲ † 50K	0Ω		
V4	6BE6	22K	.5Ω	.1Ω	0Ω	▲ † 1600Ω	▲ † 23K	▲ 2.3meg		
V5	6BJ6	6.8Ω ▲ 1.4meg	100Ω	.1Ω	0Ω	† 1600Ω	† 83K	0Ω		
V6	EBF89	† 83K	2.2meg	0Ω	.1Ω	0Ω	† 1600Ω	630K	75K	0Ω
V7	6BH6	.6Ω	100Ω	.1Ω	0Ω	† 1600Ω	† 69K	0Ω		
V8	6BH6	■ 470K	2700Ω	.1Ω	0Ω	† 2100Ω	† 16K	2700Ω		
V9	6AV6	500K	0Ω	.1Ω	0Ω	480K	80K	570K		
V10	EM840 V50078	220K	TP	0Ω	0Ω	.1Ω	† 3400Ω	† 470K	TP	† 470K
V11	12AX7 ECC83	† 490K	330K	2700Ω	0Ω	7Ω	† 490K	2.2meg	2700Ω	3.5Ω
V12	12AX7 ECC83	† 100K	320K	1500Ω	7Ω	0Ω	† 100K	1meg	1000Ω	4Ω
V13	6267 EF86	† 390K	0Ω	1000Ω	8.5Ω	7Ω	† 100K	0Ω	1000Ω	820K
V14	6C4	† 50K	NC	8.5Ω	7Ω	† 50K	1meg	1200Ω		
V15	6V4 EZ80	90Ω	NC	¶	0Ω	.1Ω	NC	85Ω	NC	NC

ALL MEASUREMENTS TAKEN IN "FM" POSITION UNLESS OTHERWISE DESIGNATED.

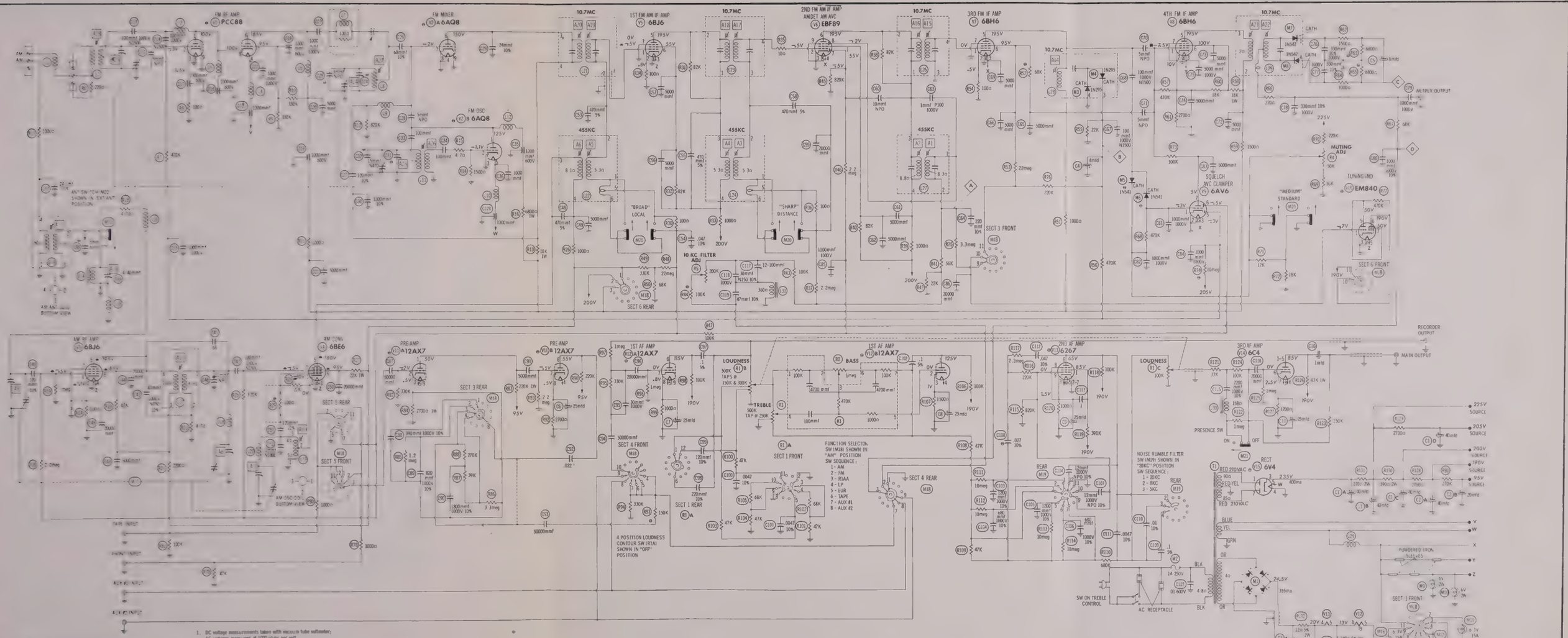
¶ THIS READING WILL VARY DEPENDING UPON THE CONDITION OF THE ELECTROLYTIC CAPACITOR CONNECTED IN THE ASSOCIATED CIRCUIT.

† MEASURED FROM PIN 3 OF V15.

▲ MEASURED IN "AM" POSITION.

■ MEASURED FROM PIN 2 OF V8.

NC NO CONNECTION.



© SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading.
Use an insulated alignment screwdriver for adjusting.
With tuning gang fully closed, adjust dial pointer to coincide with zero mark on logging scale.

AM ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
1.	.01mfd	High side to pin 7 (grid) of 6BE6 (V4). Low side to chassis.	455KC (400∿ Mod)	AM (Distant)	Tuning gang fully open	DC probe to point (A). Common to chassis.	A1, A2, A3, A4, A5, A6	Ant. switch in "Ext". Adjust for maximum output.
2.	220mmf	High side to AM antenna terminal. Low side to chassis.	1400KC	"	1400KC	"	A7, A8, A9	"
3.	"	"	600KC	"	600KC	"	A10, A11, A12	Ant. switch in "Ext.". Adjust for maximum output. Repeat steps 2 and 3.
4.		Loop	1400KC	AM (Sharp)	1400KC	"	A13	Ant. switch in "Loop". Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
5.	.01mfd	High side to pin 7 (grid) of 6BE6 (V4). Low side to chassis.	455KC (30KC Swp)	AM (Local) Loop Sw. on ext.	Tuning gang fully open	(USE SCOPE) Vert. Amp. to main output jack. Low side to chassis.	A2	Adjust SLIGHTLY for symmetrical curve.
6.	.1mfd	High side to pin 8 of V6. Low side to chassis.	10KC	AM		(USE VTVM) AC probe to main output jack. Common to chassis.	R5, C117	"Rock in" for MINIMUM deflection.

FM IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
7.		High side to ungrounded tube shield of ECC85 (V2). Low side to chassis.	10.7MC (Unmod)	FM (Distant)	Point of non-interference	DC probe to point (B). Common to chassis.	A14, A15, A16, A17, A18, A19, A20	Adjust for maximum deflection.
8.		"	"	"	"	DC probe to point (C). Common to chassis.	A21	"
9.		"	"	"	"	DC probe to point (D). Common to chassis.	A22	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.

FM IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60∿ modulation and 450KC sweep. Use 120∿ sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT SCOPE	ADJUST	REMARKS
7.		High side to ungrounded tube shield of ECC85 (V2). Low side to chassis.	10.7MC (450KC Swp)	FM (Distant)	Point of non-interference	Vert. Amp. to point (B). Low side to chassis.	A14, A15, A16, A17, A18, A19, A20	Adjust for curve of maximum amplitude and symmetry similar to Fig. 1.
8.		"	"	"	"	Vert. Amp. to point (C). Low side to chassis.	A21	Disconnect stabilizing capacitor (C5). Adjust for curve of maximum amplitude and symmetry similar to Fig. 1.
9.		"	"	"	"	Vert. Amp. to point (D). Low side to chassis.	A22	Reconnect stabilizing capacitor (C5). Adjust so that 10.7MC occurs at center of crossover lines similar to Fig. 2. SLIGHTLY retouch A21 for maximum amplitude and straightness of crossover lines.

FM RF ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
10.	Two 120Ω Carbon Resistors	Across FM antenna terminals with 120Ω in each lead.	106MC (Unmod)	FM (Distant)	106MC	DC probe to point (B). Common to chassis.	A23, A24, A25	Adjust for maximum deflection.
11.	"	"	90MC	"	90MC	"	A26, A27 A28	Adjust for maximum deflection. Repeat steps 10 and 11.
12.	"	"	98MC (45KC Swp)	"	98MC	(USE SCOPE) Vert. Amp. to main output jack. Low side to chassis).		Adjust generator output for no overload and no clipping.
13.	"	"	"	"	"	(USE VTVM) AC probe to main output jack. Common to chassis.	R4	Observe meter reading with "Distant" pushbutton depressed. Depress "Local" pushbutton and adjust R4 for a reading of 2 decibels below first meter reading.

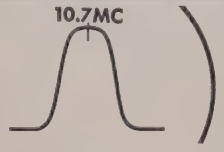


FIG. 1

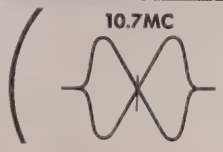
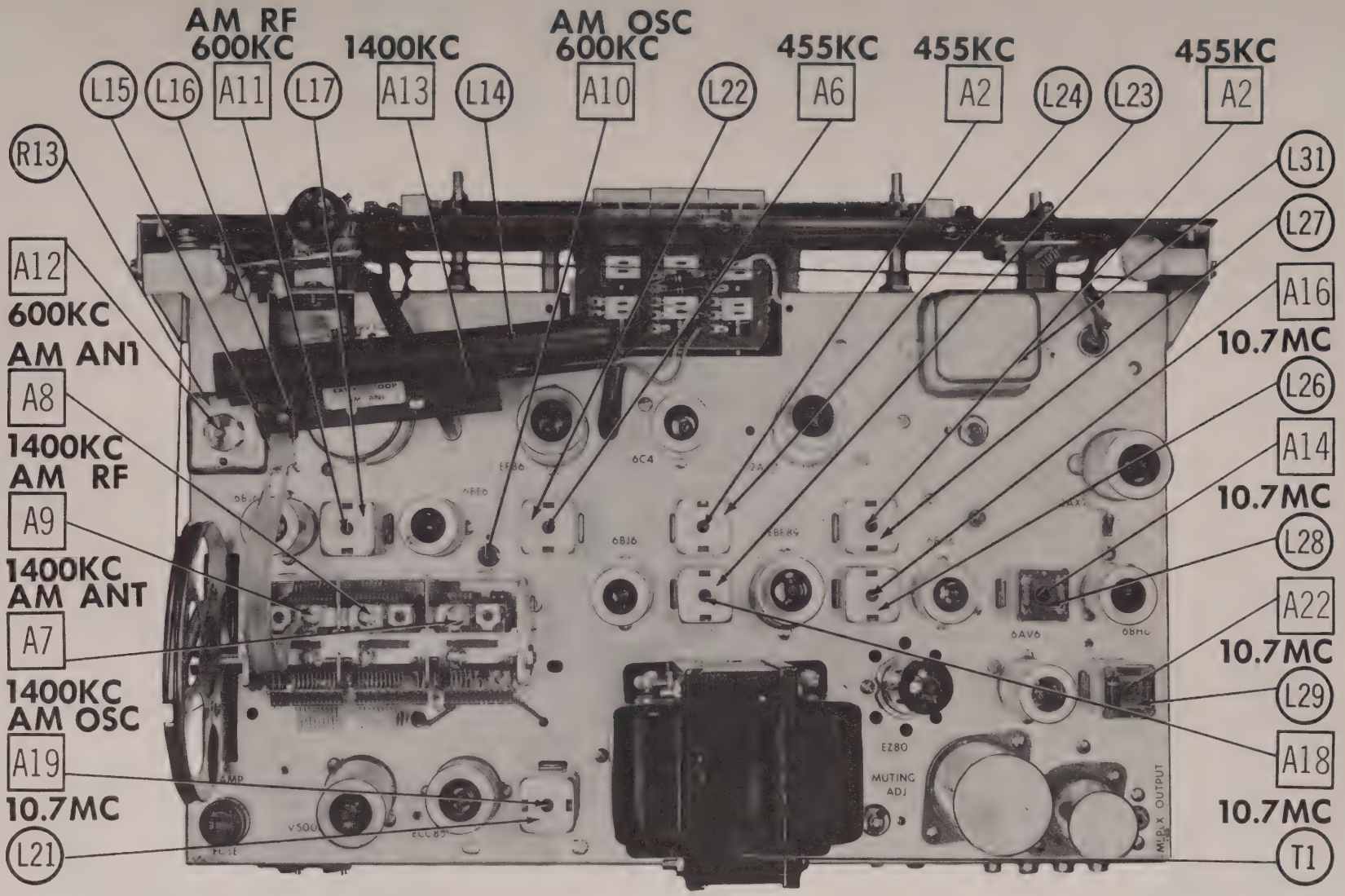
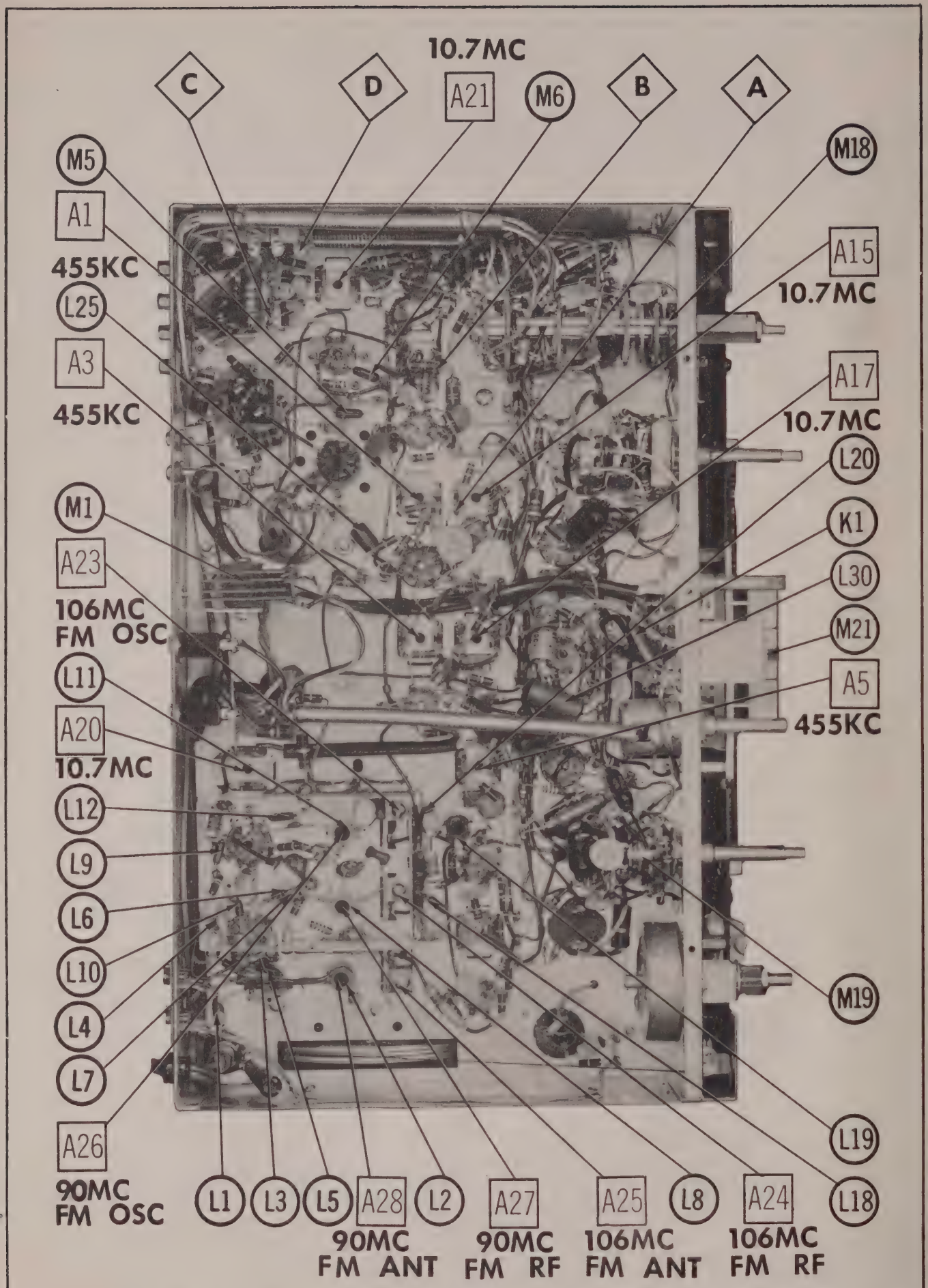


FIG. 2



CHASSIS-TOP VIEW – INDUCTOR AND ALIGNMENT IDENTIFICATION



CHASSIS BOTTOM VIEW - ALIGN, INDUCTOR, & MISC IDENT

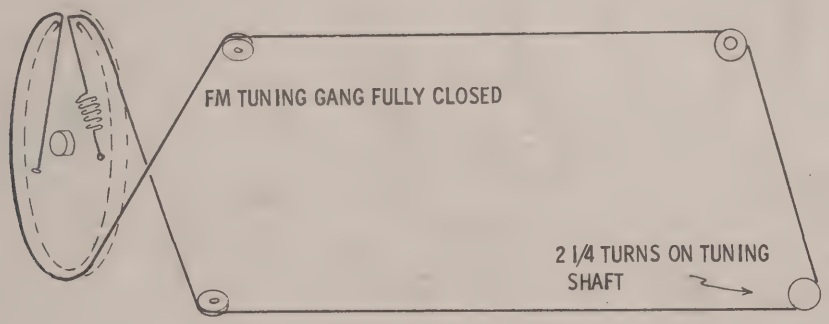
PHOTOFACT* Folder with CIRCUITRACE*

HARMAN-KARDON
MODEL F-10 (Tempo)

HARMAN-KARDON
MODEL F-10 (Tempo)

HARMAN-KARDON
MODEL F-10 (Tempo)

TRADE NAME	Harman-Kardon Model F-10 (Tempo)
MANUFACTURER	Harman-Kardon, Inc., 520 Main St., Westbury, L.I., N.Y.
TYPE SET	AC Operated FM Tuner
TUBES (Six)	Types ECC85/6AQ8 RF Amp.-Mixer, ECC85 /6AQ8 Osc.-AFC, 6AU6 1st IF Amplifier, 6AU6 2nd IF Amplifier, 6AU6 Limiter, 6AL5 Discriminator
POWER SUPPLY	105-125 Volts AC-60 Cycles
TUNGING RANGE-FREQ. MOD.	88-108MC



DIAL CORD STRINGING

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

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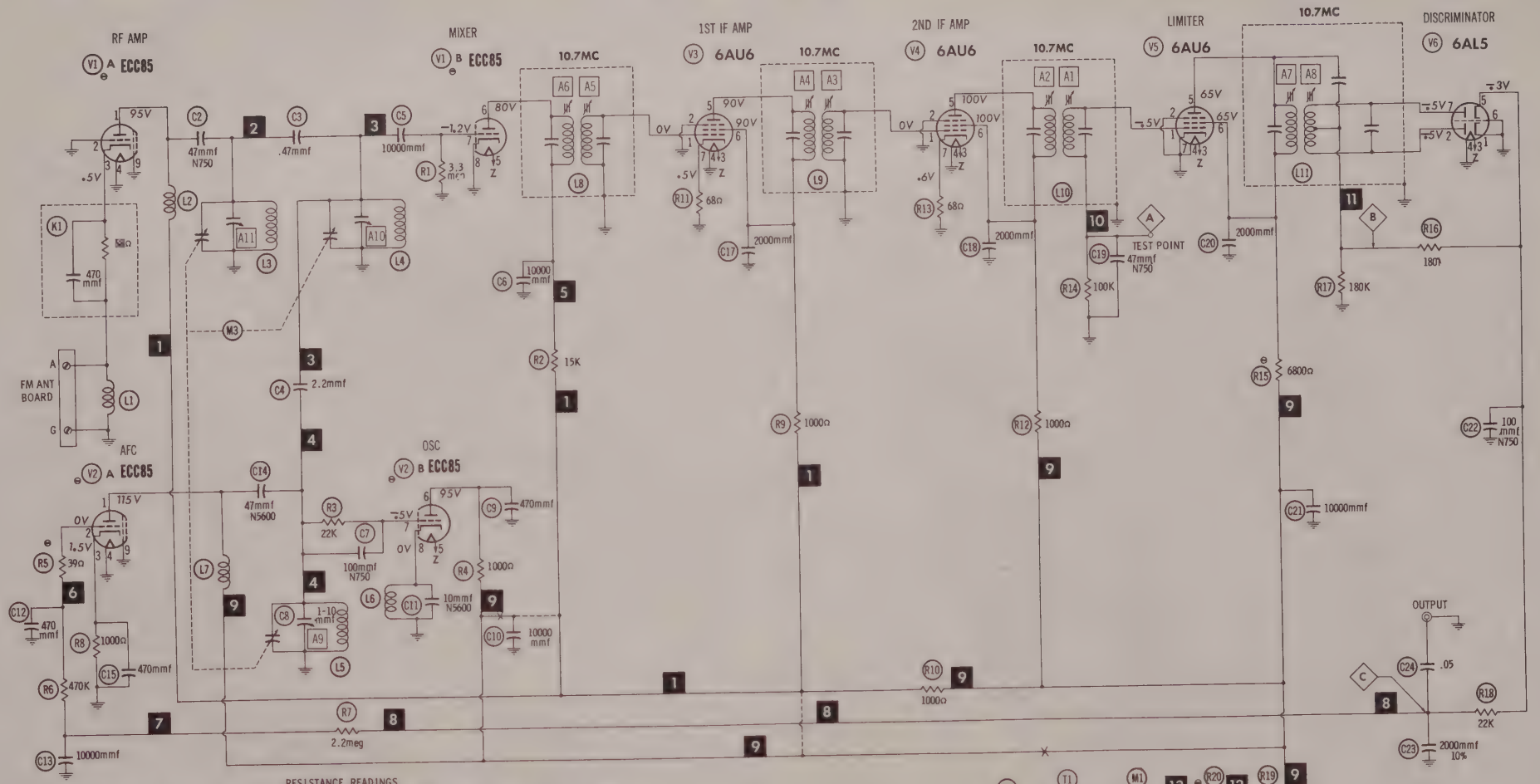
H726

SET 425 FOLDER 8



RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	6AQ8 ECC85	†1600Ω	0Ω	68Ω	0Ω	.1Ω	†17K	3.3meg	0Ω	0Ω
V2	6AQ8 ECC85	†1600Ω	3meg	1000Ω	0Ω	.1Ω	†2600Ω	22K	.1Ω	0Ω
V3	6AU6	.6Ω	0Ω	.1Ω	0Ω	†2600Ω	†2600Ω	68Ω		
V4	6AU6	.7Ω	0Ω	.1Ω	0Ω	†2600Ω	†2600Ω	68Ω		
V5	6AU6	100K	0Ω	.1Ω	0Ω	†7500Ω	†7500Ω	0Ω		
V6	6AL5	0Ω	180K	.1Ω	0Ω	360K	0Ω	180K		

† MEASURED FROM OUTPUT OF M1.

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.

⊖ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

A PHOTOFACT STANDARD NOTATION SCHEMATIC with CIRCUITRACE® *TRADE MARK

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425-8

PARTS LIST AND DESCRIPTIONS

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE	NOTES
V1	RF Amp. -Mixer	ECC85/ 6AQ8	
V2	Oscillator-AFC	ECC85/ 6AQ8	
V3	1st IF Amplifier	6AU6	
V4	2nd IF Amplifier	6AU6	
V5	Limiter	6AU6	
V6	Discriminator	6AL5	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING CAP.	RATING VOLT.	REPLACEMENT DATA Harman-Kardon PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1A	40	150	JE2092540	PRS150V4040	BBRT44215			T-052	R2347 *
B	40	150		40	BR4015				
C	60	150							

* Not normally in distributors stock. Available thru distributor on order to manufacturer.

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING CAP.	RATING VOLT	REPLACEMENT DATA Harman-Kardon PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C2	47			N750-DI 47	DTN-47	C10Q47U	NT-5447	5TCU-Q47	N750
C3	.47								
C4	2.2			NPO-SI 2.2	TCZ-2R2	CTA6V22C		5TCCB-V22	
C5	10000			BPD-01	DD-103	BYA10SI	DC511	5HK-SI	
C6	10000			BPD-01	DD-103	BYA10SI	DC511	5HK-SI	
C7	100			N750-DI 100	DTN-100	C10T1U	NT-531	5TCU-T1	N750
C8	1-10		JV20688						
C9	470			BPD-00047	DD-471	L10T47	UC-5347	5GA-T47	
C10	10000			BPD-01	DD-103	BYA10SI	DC511	5HK-SI	
C11	10								N5600
C12	470			BPD-00047	DD-471	L10T47	UC-5347	5GA-T47	
C13	10000			BPD-01	DD-103	BYA10SI	DC511	5HK-SI	
C14	47								N5600
C15	470			BPD-00047	DD-471	L10T47	UC-5347	5GA-T47	
C16	10000			BPD-01	DD-103	BYA10SI	DC511	5HK-SI	
C17	2000			BPD-002	DD-202	BYA10D2	DC522	5HK-D2	
C18	2000			BPD-002	DD-202	BYA10D2	DC522	5HK-D2	
C19	47			N750-DI 47	DTN-47	C10Q47U	NT-5447	5TCU-Q47	N750
C20	2000			BPD-002	DD-202	BYA10D2	DC522	5HK-D2	
C21	10000			BPD-01	DD-103	BYA10SI	DC511	5HK-SI	
C22	100			N750-DI 100	DTN-100	C10T1U	NT-531	5TCU-T1	N750 10%
C23	2000								
C24	.05	200		P288N-05	DD-503	CUB2S5	ACE615	2TM-S5	
C25	10000			BPD-01	DD-103	BYA10SI	DC511	5HK-SI	
C26	10000	1400		DAC-27	DD16-103	HVE16SI		20HKB-SI	
C27	10000	1400		DAC-27	DD16-103	HVE16SI		20HKB-SI	

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

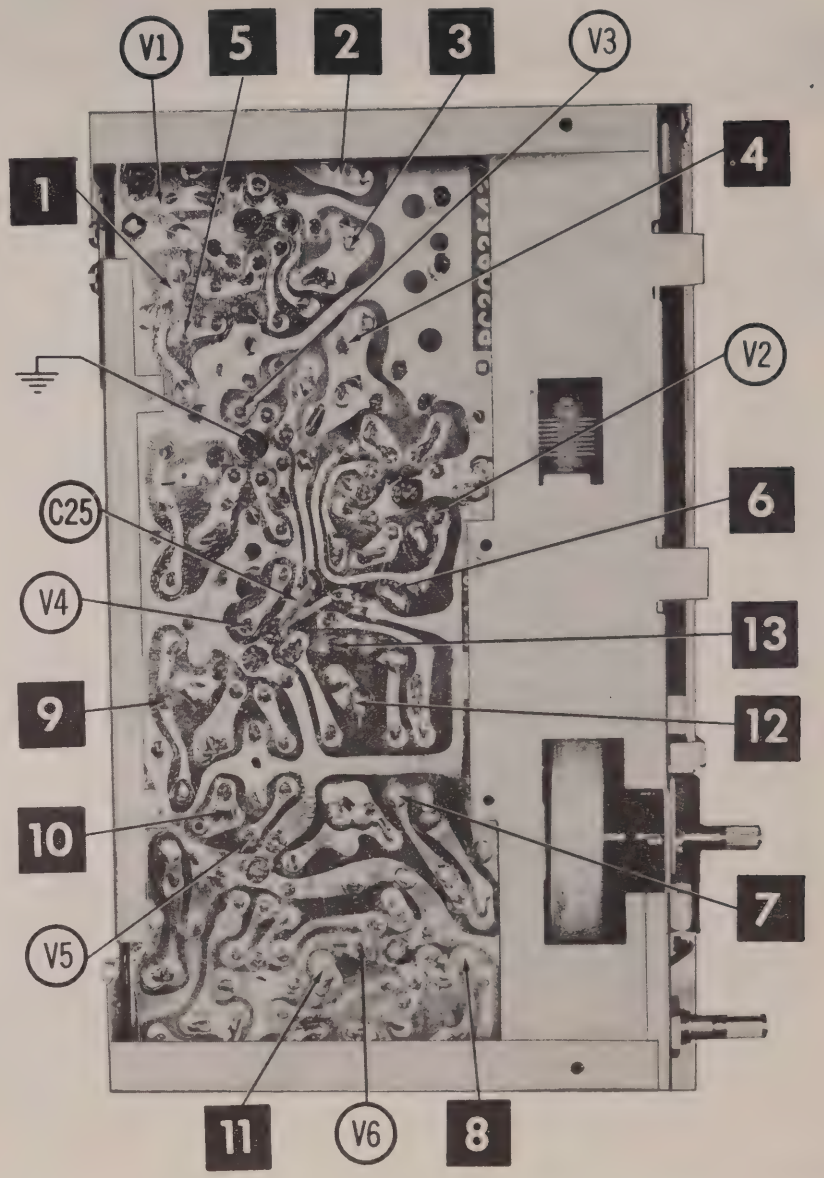
ITEM No.	RATING OHMS	RATING WATT	Harman-Kardon PART No.	NOTES
R1	3.3meg			
R2	15K			
R3	22K			
R4	1000Ω			
R5	39Ω			Note 1
R6	470K			
R7	2.2meg			
R8	1000Ω			
R9	1000Ω			
R10	1000Ω			
R11	68Ω			
R12	1000Ω			
R13	68Ω			
R14	100K			
R15	6800Ω			Note 2
R16	180K			
R17	180K			
R18	22K			
R19	330Ω			
R20	1000Ω	1		Note 3

Note 1. Some versions may use 100Ω in this application.
Note 2. Some versions may use 10K in this application.
Note 3. Some versions may use 330Ω in this application.

PRINTED BOARD

A Howard W. Sams CIRCUITRACE* Photo
*TRADE MARK

ARROWS INDICATING TUBE LOCATIONS ARE POINTING TO PIN 1 UNLESS OTHERWISE INDICATED



PARTS LIST AND DESCRIPTIONS (Continued)

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA					
		Harman-Kardon PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No.	NOTES
L1	Ant. Coil				4584		.24 Microhenry
L2	RF Choke						3.3 Microhenries
L3	RF Coil						
L4	Mixer Coil						
L5	Osc. Coil						
L6	Cathode Choke		19-1000	BC-561	4602		1 Microhenry
L7	RF Choke						3.3 Microhenries
L8	1st IF Trans.	GT2092595	16-3490			1463-PC	
L9	2nd IF Trans.	GT2092596	16-3490			1463-PC	
L10	3rd IF Trans.	GT2092597	16-3490			1463-PC	
L11	Disc. Trans.	GT2092598					

TRANSFORMER (POWER)

ITEM No.	RATING		REPLACEMENT DATA						
	PRI.	SEC. 1	Harman-Kardon PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117V	140V @ .035A tap @ 6.3V @ 2.1A	FT2092528						

COMPONENT COMBINATIONS

ITEM No.	USE	DESCRIPTION	Harman-Kardon PART No.	REPLACEMENT DATA
K1	Ant. Coupling	470mmf, 68Ω		

SELENIUM RECTIFIER

ITEM No.	RATING	REPLACEMENT DATA				NOTES
	CURRENT (Measured)	Harman-Kardon PART No.	FEDERAL PART No.	INTERNATIONAL PART No.	SARKES TARZIAN PART No.	
M1	.035A	Z1362133		D-5421		

MISCELLANEOUS

ITEM No.	PART NAME	Harman-Kardon PART No.	NOTES
M2	Lamp		#1847
M3	Tuning Cap.	JV2092541	3 Gang
M4	Switch	ER2092537	On-Off, SPST, Rotary, Snap Type
	Printed Board	BC20925424	

CABINETS & CABINET PARTS

(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

NAME	PART NO.	DESCRIPTION
Knob	P20778	Tuning, Off-On
Cage	P2092536	
Dial Glass	P2092531	

WIRING DATA

General-use Unshielded Hook-up Wire ..... Use BELDEN No. 8530 (Solid) Available in Ten Colors
8524 (Stranded) Available in Ten Colors

Power Cord ..... Use BELDEN No. 1765-B (6 Ft. Length)
1725-K (7½ Ft. Length)

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

FM IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
1.	200mmf	High side to FM mixer lug of tuning gang. Low side to chassis.	10.7MC (Unmod)	Point of non-interference	DC probe to point Ⓐ. Common to chassis.	A1, A2, A3, A4, A5, A6	Adjust for maximum deflection.
2.	"	"	"	"	DC probe thru 1meg to point Ⓑ. Common to chassis.	A7	"
3.	"	"	"	"	DC probe to point Ⓒ. Common to chassis.	A8	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.

FM IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60~ modulation and 450KC sweep. Use 120~ sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	CONNECT SCOPE	ADJUST	REMARKS
1.	200mmf	High side to FM Mixer lug of tuning gang. Low side to chassis.	10.7MC (450KC Swp)	Point of non-interference	Vert. Amp. to point Ⓐ. Low side to chassis.	A1, A2, A3, A4, A5, A6	Adjust for curve of maximum amplitude and symmetry similar to Fig. 1.
2.	"	"	"	"	Vert. Amp. thru 27K to point Ⓑ. Low side to chassis.	A7	Adjust for curve of maximum amplitude and symmetry similar to Fig. 1.
3.	"	"	"	"	Vert. Amp. to point Ⓒ. Common to chassis.	A8	Adjust so that 10.7MC occurs at center of crossover lines similar to Fig. 2. SLIGHTLY retouch A7 for maximum amplitude and straightness of crossover lines.

FM RF ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
4.	270Ω Carbon Resistor	Across FM antenna terminals.	106MC (Unmod)	106MC	DC probe to point Ⓐ. Common to chassis.	A9, A10, A11	Adjust for maximum deflection.
5.	"	"	90MC	90MC	"	L5, L4, L3	Adjust for maximum deflection by compressing or expanding coil turns. Repeat steps 4 and 5.

FIG. 1

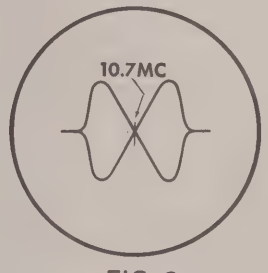
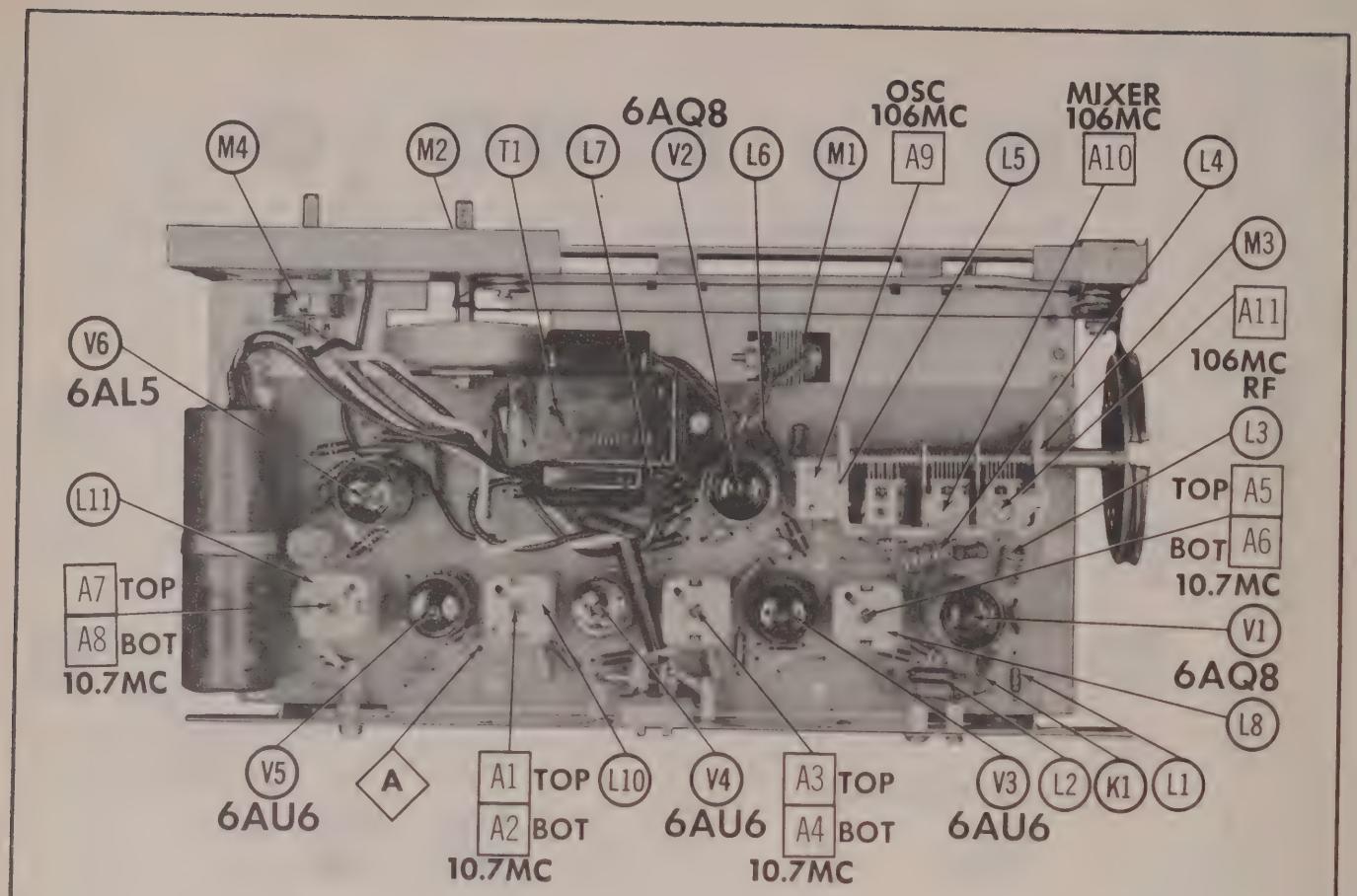
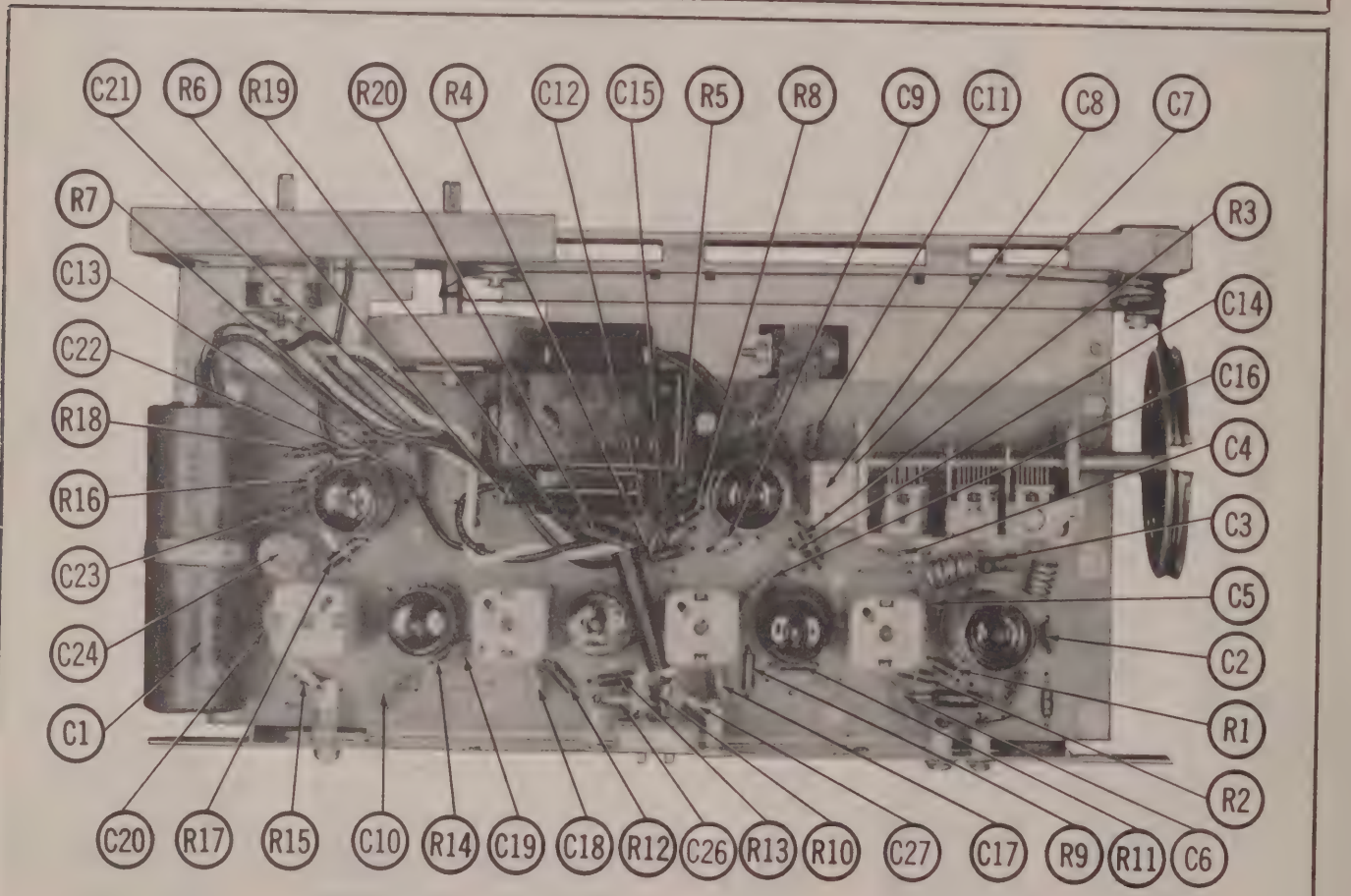


FIG. 2



CHASSIS TOP VIEW



CHASSIS BOTTOM VIEW

PHOTOFACT* Folder

EIA MEMBER ELECTRONIC INDUSTRIES ASSOCIATION

LEAK MODEL
Varislope II

LEAK MODEL
Varislope II

LEAK MODEL
Varislope II

TRADE NAME	Leak Model Varislope III
IMPORTER	British Industries Corp., 80 Shore Road, Port Washington, N. Y.
TYPE SET	Externally Powered Preamplifier
TUBES (Two)	Types 6267/ EF86 (Or) Z729 Preamplifier, 6267/ EF86 (Or) Z729 Preamplifier

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

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H743

PARTS LIST AND DESCRIPTIONS

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE
V1	Preamplifier	6267/ EF86 ①
V2	Preamplifier	6267/ EF86 ①

Note 1. Alternate type Z729.

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT.	LEAK PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1	8	350		PRS350V8	BR835	TC61	TD-8-350	MT-3508	TVA-1603
C2	50	12		SRE12V50	BBR50-25	TC29	TD-50-25	MQ-0150	TVA-1206
C3	50	12		SRE12V50	BBR50-25	TC29	TD-50-25	MQ-0150	TVA-1206

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP.	VOLT	LEAK PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	SPRAGUE PART No.	
C4	.1	150		P288N-1	DF-104	CUB2P1	GEM-201	2TM-P1	
C5	.1	250		P488N-1	DF-104	CUB4P1	GEM-401	4TM-P1	
C6	.1	250		P488N-1	DF-104	CUB4P1	GEM-401	4TM-P1	
C7	250			1468-00025		5W5T25		1FM-325	
C8	15			1468-000015		5W5Q15		1FM-415	
C9	100			1468-0001		5W5T1	MC235	1FM-31	
C10	100			1468-0001		5W5T1	MC235	1FM-31	
C11	150			1468-00015		5W5T15		1FM-315	
C12	50			1468-00005		5W5Q5	MC225	1FM-45	
C13	125								
C14	50			1468-00005		5W5Q5	MC225	1FM-45	
C15	.1	150		P288N-1	DF-104	CUB2P1	GEM-201	2TM-P1	
C16	1000			1467-001		5W5D1	MC255	1FM-21	
C17	1000			1467-001		5W5D1	MC255	1FM-21	
C18	200			1468-0002		5W5T2	MC237	1FM-32	
C19	200			1468-0002		5W5T2	MC237	1FM-32	
C20	300			1468-0003		5W5T3	MC241	1FM-33	
C21	10000			S110000	D6-103	LT6S1	DC511	5HK-S1	
C22	.25	250		P488N-25		CUB4P25	GEM4025	4TM-P25	
C23	500			1468-0005		5W5T5	MC245	1FM-35	
C24	500			1468-0005		5W5T5	MC245	1FM-35	
C25	1000			1467-001		5W5D1	MC255	1FM-21	
C26	6500								
C27	2500			1467-0025		5W5D25		1FM-225	
C28	.25	250		P488N-25		CUB4P25	GEM-4025	4TM-P25	
C29	20000			S120000		LT6S2		5HK-S2	

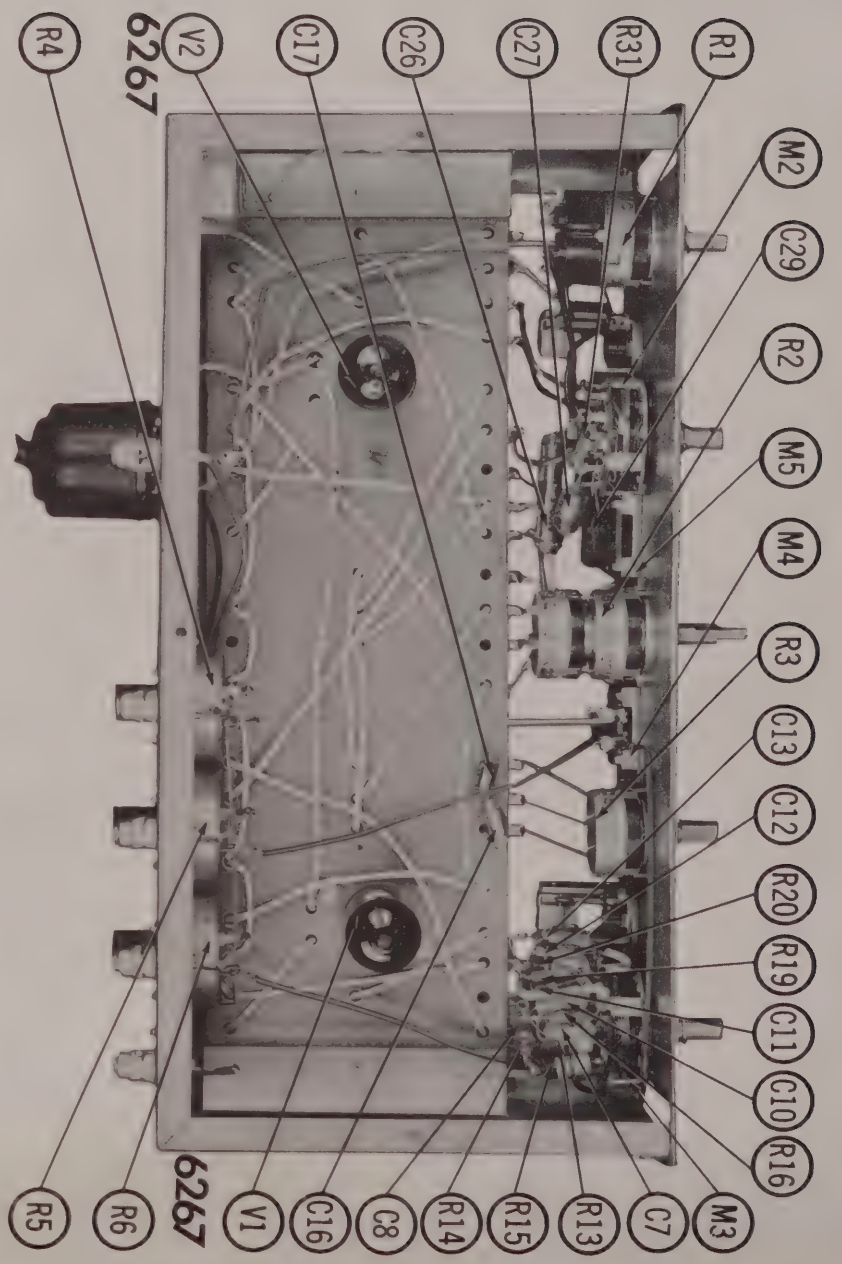
CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	LEAK PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1A	100K	½		B-41	A47-100K-Z	Q13-128	U39	Volume
B	Shaft			Not Req.	RS-2	PQ	Not Req.	
C	Switch			KB-2 or KR-2*	SWE-20	76-2	US-27	
R2A	500K	½		F1-41			■ UE3867	Treble
B	2meg	½		R2-70				Slope
R3A	5meg	½		B-87	A47-5meg-S	Q11-141	U67	Bass
B	Shaft			Not Req.	RS-2	PQ	Not Req.	
R4	100K	½						Pickup 1
R5	100K	½						Pickup 2
R6	250K	½						Tuner

* Use KR with CRL "Red Label" controls and KB with "Blue Label" controls.

■ STA-LOC Equivalent: FA55A, OS750, RU26R, IS1062.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING OHMS	RATING WATT	LEAK PART No.	NOTES
R7	120K			
R8	2.2meg			
R9	10K			
R10	330K			
R11	2.2meg			
R12	4700Ω			
R13	50meg	1		
R14	1.8meg			
R15	50meg	1		
R16	1.8meg			
R17	50meg	1		
R18	50meg	1		
R19	2.2meg			
R20	50meg	1		
R21	1.8meg			
R22	50meg	1		
R23	470K			
R24	4.7meg			
R25	50meg	1		

ITEM No.	RATING OHMS	RATING WATT	LEAK PART No.	NOTES
R26	50meg	1		
R27	4.7meg			
R28	330K			
R29	330K			
R30	330K			
R31	2.2meg			
R32	2.2meg			
R33	10K			
R34	4700Ω			
R35	220K			
R36	20K			
R37	20K			
R38	10K			
R39	2.2meg			
R40	2.2meg			
R41	2.2meg			
R42	47K			
R43	100K			
R44	2.2meg			

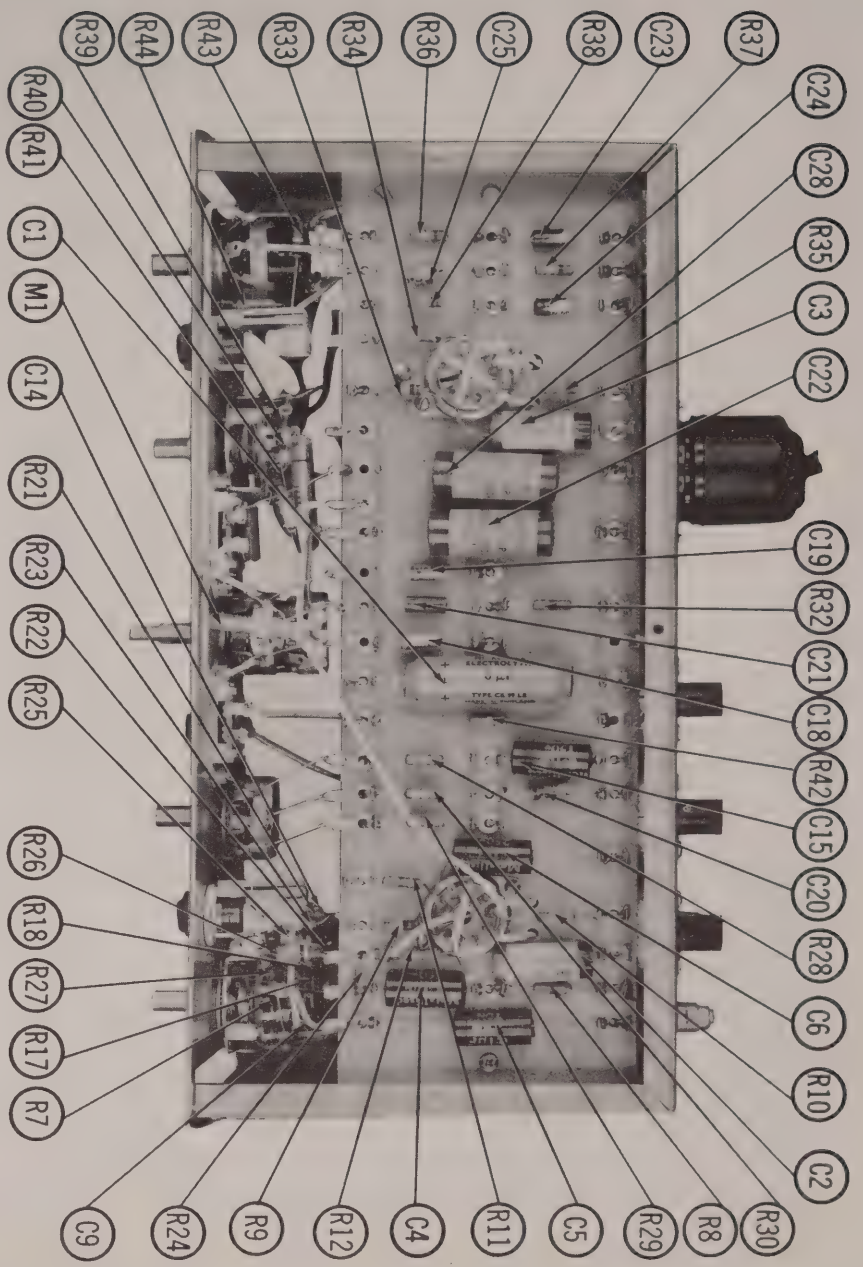
MISCELLANEOUS

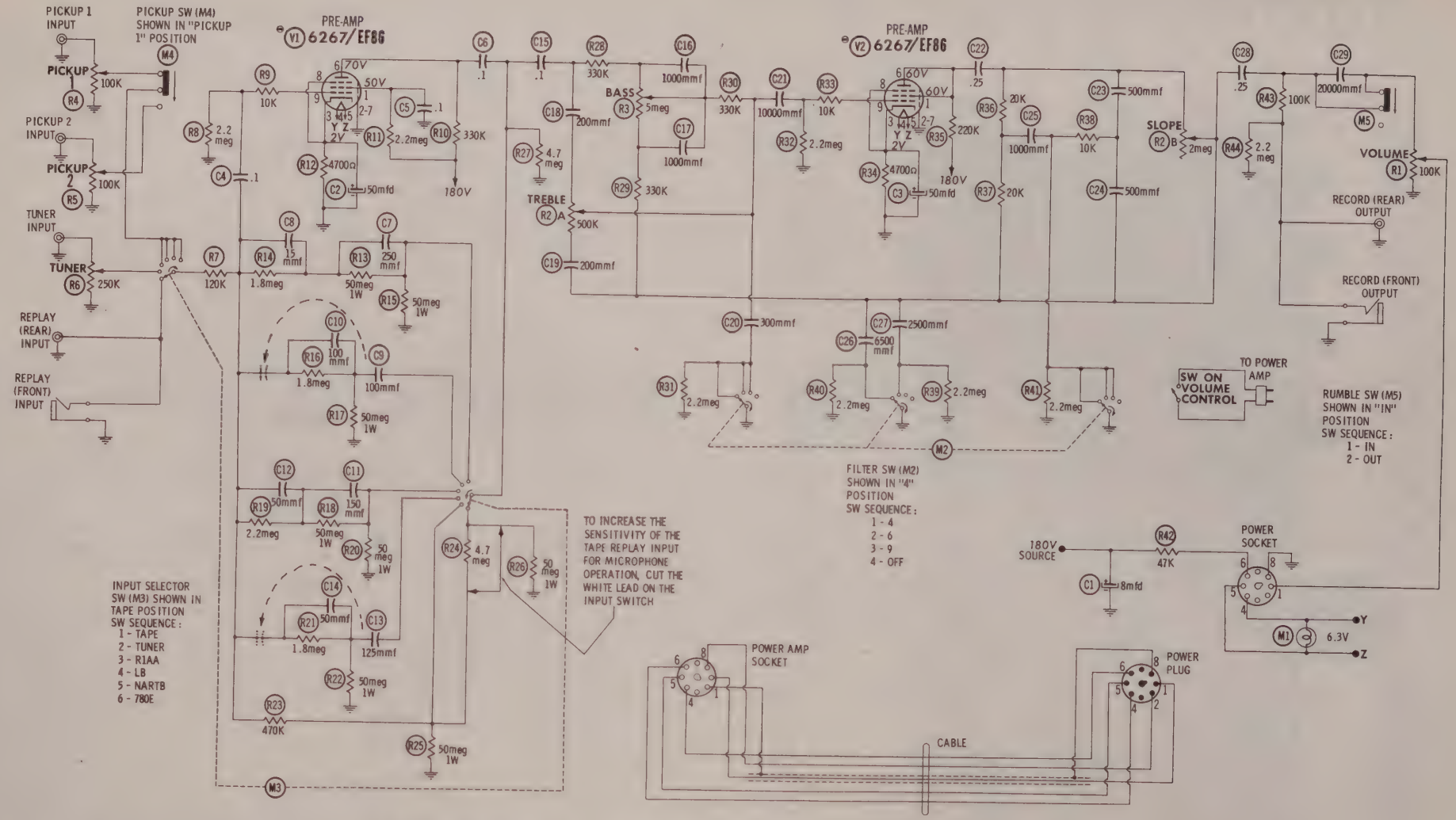
ITEM No.	PART NAME	LEAK PART No.	NOTES
M1	Lamp		6.3V
M2	Switch		Filter, Rotary, Wafer Type
M3	Switch		Input, Rotary, Wafer Type
M4	Switch		Pickup, DPDT, Slide Type
M5	Switch		Rumble, SPST, Slide Type

WIRING DATA

General-use Unshielded Hook-up Wire .....: Use BELDEN No. 8530 (Solid) Available in Ten Colors
8524 (Stranded) Available in Ten Colors

CHASSIS—BOTTOM VIEW




PICKUP 1 INPUT
PICKUP SW (M4) SHOWN IN "PICKUP 1" POSITION
PRE-AMP ⊖ V1 6267/EF86
PRE-AMP ⊖ V2 6267/EF86
PICKUP 2 INPUT
TUNER INPUT
REPLAY (REAR) INPUT
REPLAY (FRONT) INPUT
BASS
TREBLE
SLOPE
VOLUME
RECORD (REAR) OUTPUT
RECORD (FRONT) OUTPUT
SW ON VOLUME CONTROL
TO POWER AMP
RUMBLE SW (M5) SHOWN IN "IN" POSITION
SW SEQUENCE: 1 - IN 2 - OUT
FILTER SW (M2) SHOWN IN "4" POSITION
SW SEQUENCE: 1 - 4 2 - 6 3 - 9 4 - OFF
INPUT SELECTOR SW (M3) SHOWN IN TAPE POSITION
SW SEQUENCE: 1 - TAPE 2 - TUNER 3 - R1AA 4 - LB 5 - NARTB 6 - 780E
TO INCREASE THE SENSITIVITY OF THE TAPE REPLAY INPUT FOR MICROPHONE OPERATION, CUT THE WHITE LEAD ON THE INPUT SWITCH
180V SOURCE
POWER SOCKET
POWER AMP SOCKET
POWER PLUG
CABLE
6.3V

⊖ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance of component values makes possible a variation of ±15% in voltage and resistance readings.
6. All controls at minimum, proper output load connected.

RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	6267 EF86	† 2.2meg	0Ω	4700Ω	▪0Ω	▪1.9Ω	† 370K	0Ω	4700Ω	2.2meg
V2	6267 EF86	† 260K	0Ω	4700Ω	▪1.7Ω	▪0Ω	† 260K	0Ω	4700Ω	2.2meg

† MEASURED FROM PIN 6 OF POWER SOCKET
▪ MEASURED FROM PIN 4 OF POWER SOCKET

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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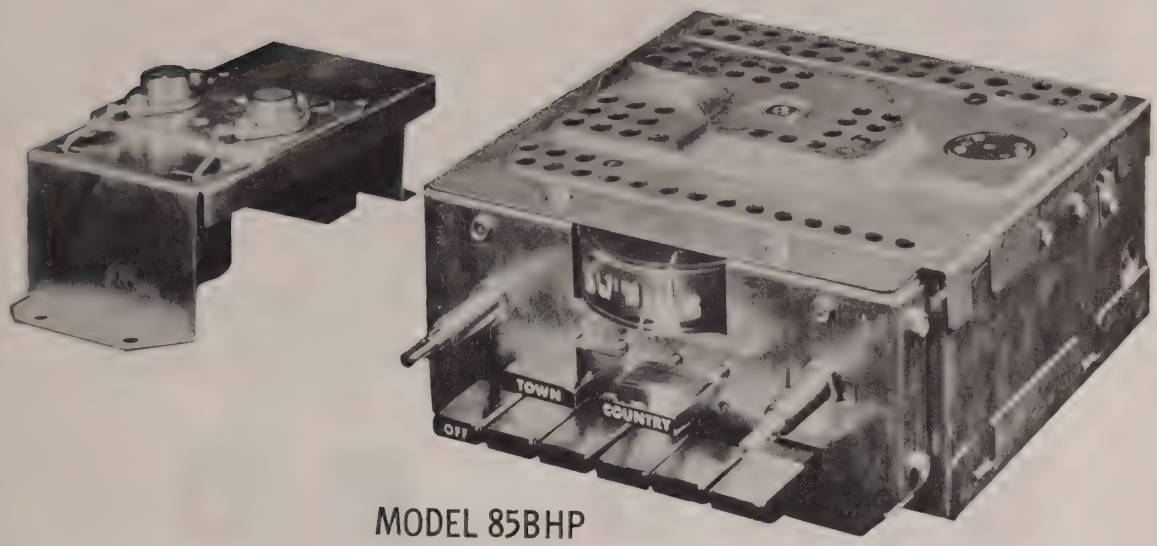
PHOTOFACT* Folder

with CIRCUITRACE*

LINCOLN MODELS 85BHP (FFC-18805-C, -D)
95BH (B9FL-15801-A, -B, FFC-19061-B)

LINCOLN MODELS 85BHP (FFC-18805-C, -D)
95BH (B9FL-15801-A, -B, FFC-19061-B)



MODEL 85BHP

LINCOLN MODELS 85BHP (FFC-18805-C, -D)
95BH (B9FL-15801-A, -B, FFC-19061-B)

TRADE NAME	Lincoln Models 85BHP (FFC-18805-C, -D ; Above Serial #50000) For 1958 Lincoln Automobiles, 95BH (B9FL-15801-A, -B ; FFC-19061-B) For 1959 Lincoln Automobiles
MANUFACTURER	Bendix Radio Div., Bendix Aviation Corp., Baltimore 4, Maryland
TYPE SET	Battery Operated Custom Built AM Automobile Receiver With Transistorized Output
TUBES (Five)	Types 12CX6 RF Amplifier, 12AD6 Converter, 12CN5 IF Amplifier, 12J8 Det.-AVC-AF Amp., 12U7 AF Amp.-Trigger
POWER SUPPLY	12 Volt Storage Battery RATING 1.2 Amp. @ 12.6 Volts DC
TUNING RANGE — BROADCAST	540-1600KC

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

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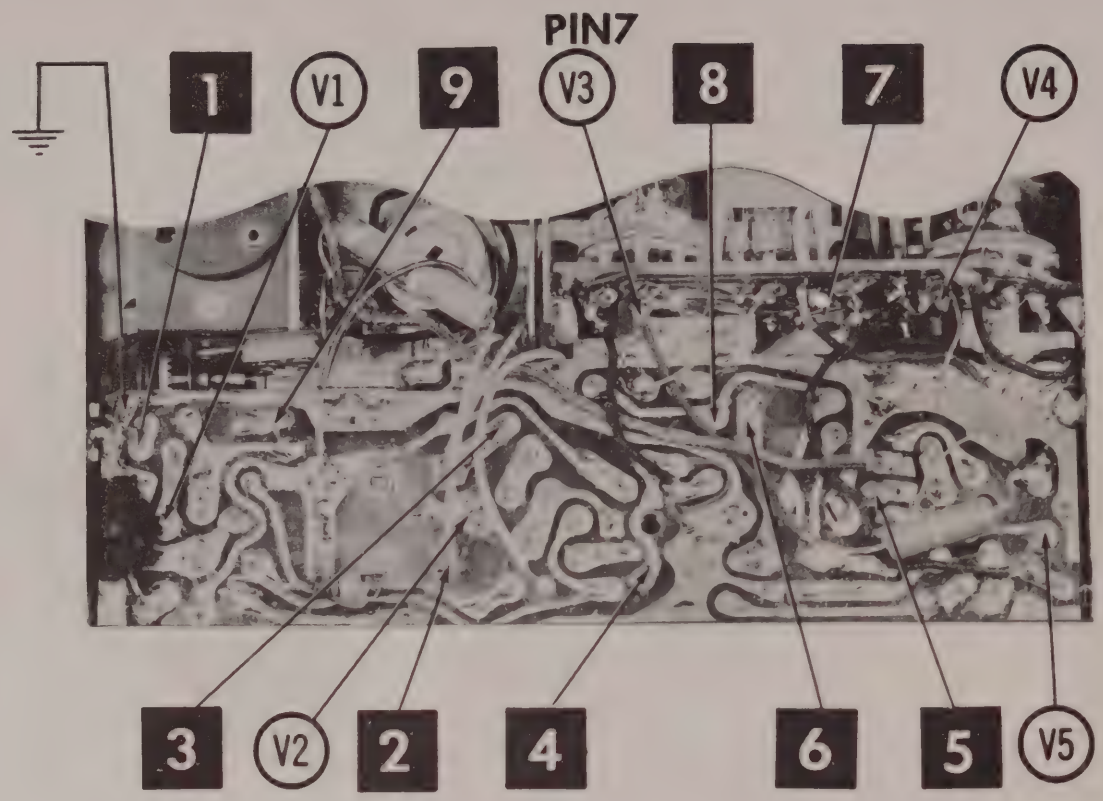
H742

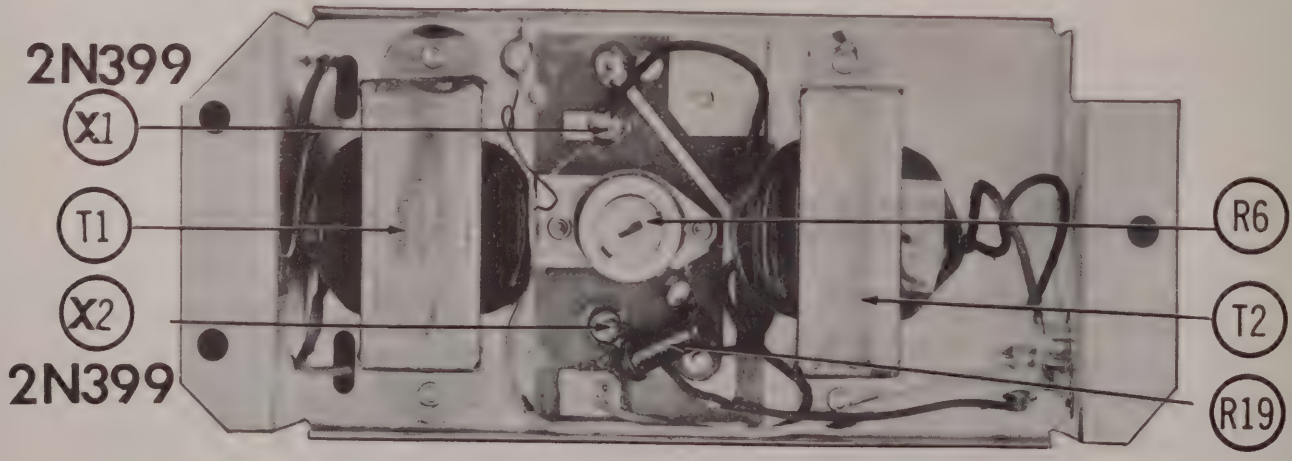
SET 425 FOLDER 10



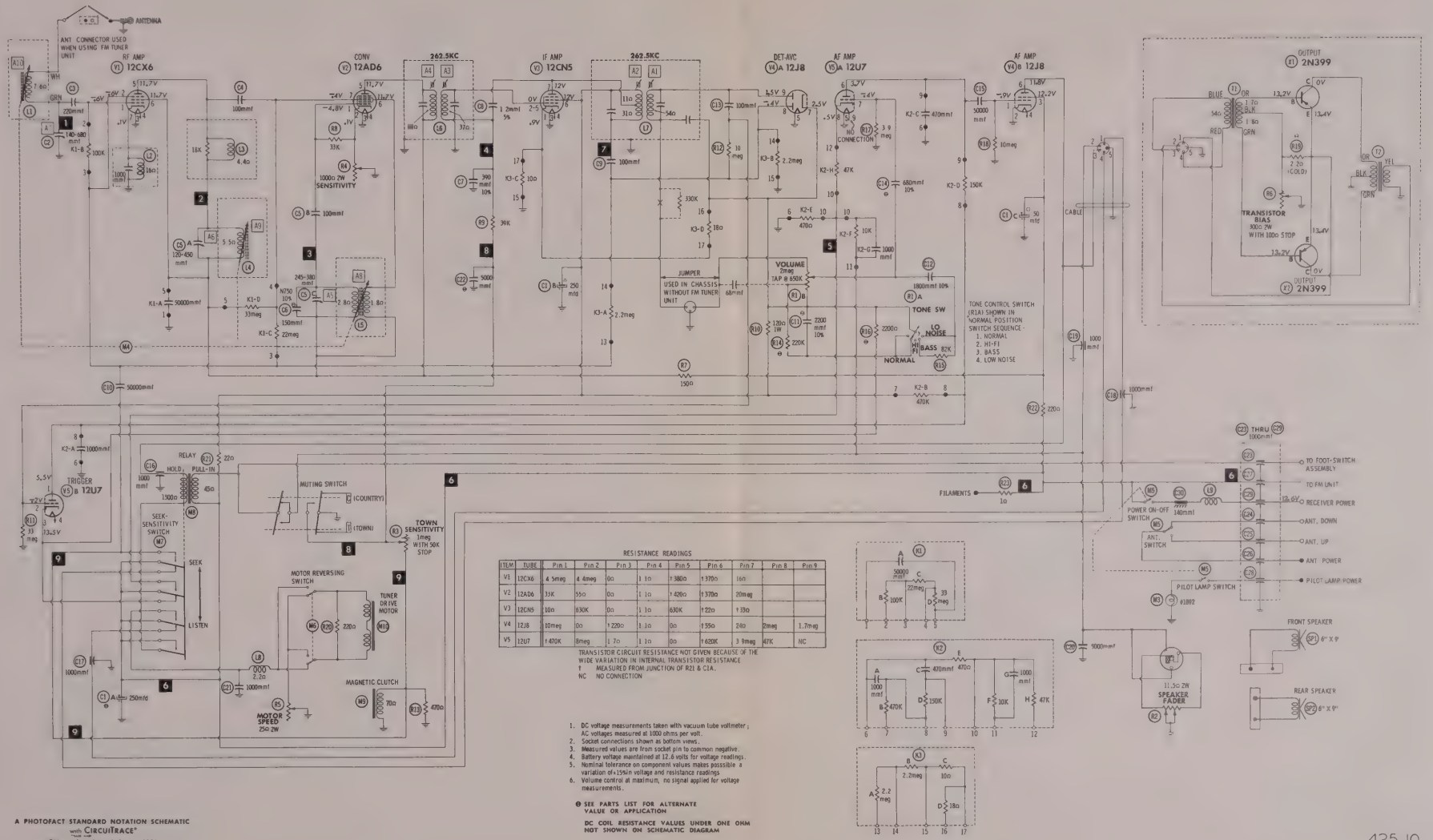
A Howard W. Sams CIRCUITRACE* Photo
*TRADE MARK

PRINTED BOARD

ARROWS INDICATING TUBE LOCATIONS ARE POINTING TO PIN 1 UNLESS OTHERWISE INDICATED



OUTPUT CHASSIS



RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	12CX6	4.5meg	4.4meg	0Ω	1.1Ω	↑380Ω	↑370Ω	16Ω		
V2	12AD6	33K	55Ω	0Ω	1.1Ω	↑420Ω	↑370Ω	20meg		
V3	12CN5	10Ω	630K	0Ω	1.1Ω	630K	↑22Ω	↑13Ω		
V4	12J8	10meg	0Ω	↑220Ω	1.1Ω	0Ω	↑55Ω	24Ω	2meg	1.7meg
V5	12U7	↑470K	8meg	1.7Ω	1.1Ω	0Ω	↑620K	3.9meg	47K	NC

TRANSISTOR CIRCUIT RESISTANCE NOT GIVEN BECAUSE OF THE WIDE VARIATION IN INTERNAL TRANSISTOR RESISTANCE
↑ MEASURED FROM JUNCTION OF R21 & C1A.
NC NO CONNECTION

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Battery voltage maintained at 12.6 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings
6. Volume control at maximum, no signal applied for voltage measurements.

Θ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

A PHOTOFACT STANDARD NOTATION SCHEMATIC with CIRCUITRACE™

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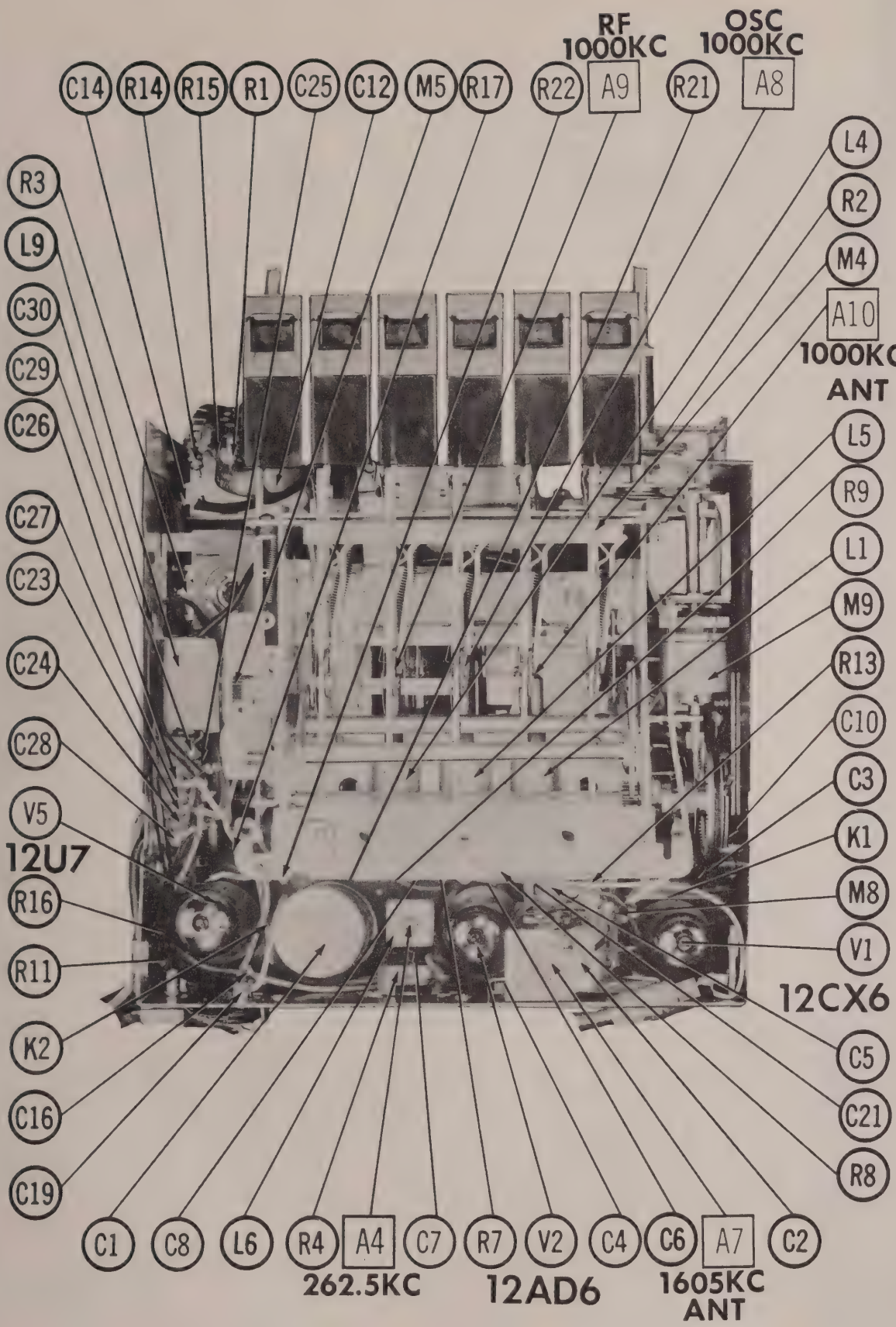
425-10



CHASSIS-TOP VIEW

LINCOLN
MODEL 85BHP

FOLDER 10

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
1.	.1mfd	High side to pin 7 (grid) of 12AD6 (V2). Low side to chassis.	262.5KC (400∿ Mod)	High Freq. end stop	DC probe to high side of R1B. Common to pin 7 of V4.	A1, A2, A3, A4	Adjust for maximum deflection.
2.	Fig. 1	Thru dummy to antenna receptacle.	1605KC	"	"	A5, A6, A7	Adjust for maximum deflection. Repeat steps 1 and 2.
3.	With radio installed in car and antenna fully extended, tune in a weak station near 1600KC, and adjust A7 for maximum output. Step 4 is not necessary unless tuner has been tampered with or associated components have been replaced. If necessary, back tuning cores (A8, A9, A10) out of coils but not out of coil forms. Repeat step 2.						
4.	Fig. 1	Thru dummy to antenna receptacle.	1000KC (400∿ Mod)	Carriage ½" from high end stop	"	A8, A9, A10	Adjust for maximum deflection. Repeat steps 2 and 4.
5.	"	"	1000KC @ 3 microvolts (400∿ Mod)	Tune to 1000KC signal	(Output Meter) Across voice coil	R4	Adjust for 1.75 volts (approx. 1 watt).
6.	"	"	1000KC @ 250 microvolts	"	"	R3	Turn R3 fully counterclockwise. Press "Town" button. Turn R3 slowly until tuner stops seeking.
	Adjust generator for 125 microvolts. Press "Town" button. Tuner should NOT stop seeking. If necessary repeat steps 5 and 6.						

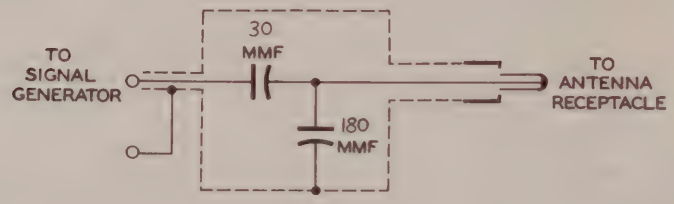


FIG. 1

PUSHBUTTON ADJUSTMENT

1. Tune manually to desired station.
2. Pull pushbutton out ; then push in firmly.
3. Repeat for remaining pushbuttons.

TRANSISTOR BIAS ADJUSTMENT

1. Disconnect output transformer center tap from chassis.
2. Connect a DC milliameter, not more than .2Ω max. internal resistance) between center tap of output transformer (T2) and chassis.
3. Set DC input to 14.4DC.
4. Turn radio on and with no signal input, adjust R6 for a reading of .100 ampere.

PARTS LIST AND DESCRIPTIONS

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE	NOTES
V1	RF Amplifier	12CX6	
V2	Converter	12AD6	
V3	IF Amplifier	12CN5	
V4	Det.-AVC-AF Amp.	12J8	
V5	AF Amp.-Trigger	12U7	

TRANSISTORS

ITEM No.	ORIG. TYPE	USE	REPLACEMENT DATA				NOTES
			CBS PART No.	RCA PART No.	RAYTHEON PART No.	SYLVANIA PART No.	
X1	2N399	Output	CBS-2N236A			2N242	PNP
X2	2N399	Output	CBS-2N236A			2N242	PNP

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT.	BENDIX PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1A	250	16	220353-5 ①	AFH3-00-80					R2669 *
B	▲250	16							
C	■50	16							

① Some versions may use 500-250-50mfd in this application (Part #220353-8).
② Not normally in distributors stock. Available thru distributor on order to manufacturer.

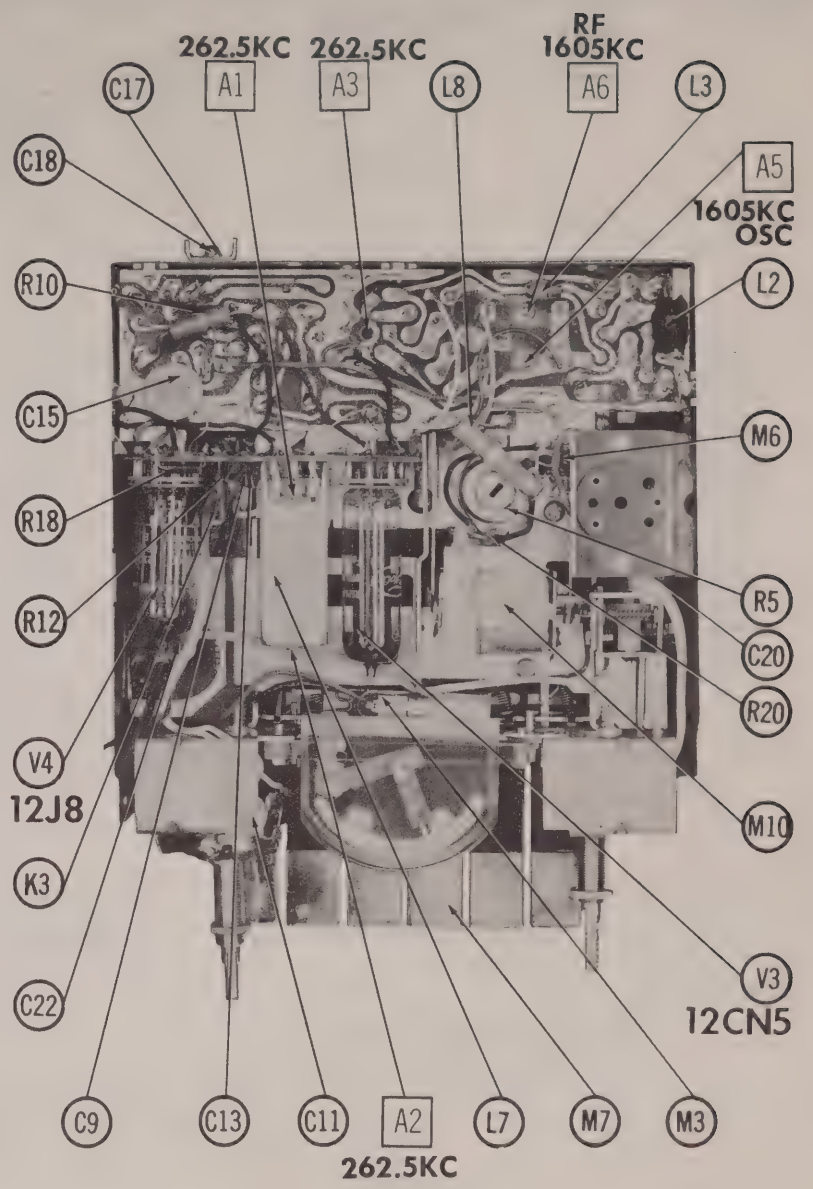
FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP.	VOLT	BENDIX PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	SPRAGUE PART No.	
C2	140-680		219083-2						
C3	220		220332-41	BPD-00022	DD-221	L10T22	UC-5322	5GA-T22	
C4	100		220332-14	BPD-0001	DD-101	L10T1	UC-531	5GA-T1	
C5A	120-450								
B	100		219092-4						
C	245-380								
C6	150		220332-45	N750-DI 150	DTN-150	C10T15U		5TCU-T15	N750 10% ①
C7	390		220348-510	1469-00039	MD-391	5R5T39		MS-339	10%
C8	1.2		220212-13						5%
C9	100		220332-39	BPD-0001	DD-101	L10T1	UC-531	5GA-T1	
C10	50000		220332-40	BPD-05	DF-503			5HK-S5	
C11	2200		2090058U-222K						10% ②
C12	1800		2090058U-182K						10%
C13	100		220332-39	BPD-0001	DD-101	L10T1		5GA-T1	
C14	680		2090058U-681K		MD-681				10% ③
C15	50000		220095-45	BPD-05	DF-503			5HK-S5	
C16	1000		2090546-2	EF-001	MFT-1000			503C-D1	
C17	1000		2090546-2	EF-001	MFT-1000			503C-D1	
C18	1000		2090546-2	EF-001	MFT-1000			503C-D1	
C19	1000		2090546-2	EF-001	MFT-1000			503C-D1	
C20	5000		2090058T-502M	BPD-005	DD-502	BYA10D5	DC525	5HK-D5	
C21	1000		2090058T-102P	BPD-001	DD-102	BYA6D1	DC521	5HK-D1	
C22	5000		2090058T-502M	BPD-005	DD-502	BYA10D5	DC525	5HK-D5	④
C23	1000		2090546-2	EF-001	MFT-1000			503C-D1	
C24	1000		2090546-2	EF-001	MFT-1000			503C-D1	
C25	1000		2090546-2	EF-001	MFT-1000			503C-D1	
C26	1000		2090546-2	EF-001	MFT-1000			503C-D1	
C27	1000		2090546-2	EF-001	MFT-1000			503C-D1	
C28	1000		2090546-2	EF-001	MFT-1000			503C-D1	
C29	1000		2090546-2					503C-D1	
C30	140		220267-11						

① Model 95BH uses 69mmf N750 10% in this application (Part #220332-62).
② Model 95BH uses 2700mmf 10% in this application (Part #2090058U-272K).
③ Model 95BH uses 1000mmf 10% in this application (Part #2090058U-102K).
④ Some versions may use 1000mmf in this application (Part #2090058T-102P).

CHASSIS—BOTTOM VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	BENDIX PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1A	Switch		2090276-1					Tone
B	2meg	½						Volume, Tap @ 650K
R2	11.5Ω	2(WW)	219679-3					Speaker Fader
R3	1meg	½	2090560-2					Town Sensitivity, with 50K stop
R4	1000Ω	2(WW)	219555-15		39-1000		FL-1.5K	Sensitivity
R5	25Ω	2(WW)	219555-12					Motor Speed
R6	300Ω	2(WW)	219555-17					Transistor Bias, with 100Ω stop

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING		BENDIX PART No.	NOTES
	OHMS	WATT		
R7	150Ω		220604B-151	
R8	33K		220604B-333	
R9	39K		220603B-393	
R10	120Ω	1	220551C-121K	
R11	33meg		220604B-336	
R12	10meg		220604B-106	
R13	470Ω		220604B-471	
R14	220K		220603B-224	Note 1
R15	82K		220603B-823	

ITEM No.	RATING		BENDIX PART No.	NOTES
	OHMS	WATT		
R16	2200Ω		220604B-222	
R17	3.9meg		220603B-395	
R18	10meg		220604B-106	
R19	2.2ΩCold		220629-7	Note 2
R20	220Ω		220604B-221	
R21	22Ω		220604B-221	
R22	220Ω		220604B-221	
R23	1Ω		2090438-7	10"Cupron Wire

Note 1. Model 95BH uses 180K in this application (Part #220603B-184).
Note 2. Some versions may use two 4.5Ω resistor (Cold) in series.

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA					NOTES
		BENDIX PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No.	
L1	Ant. Coil						Part of M4
L2	Cathode Choke	2090532-2					Wound on 1000mmf
L3	RF Choke	2090088-3					50 Microhenries, wound on 18K
L4	RF Coil						Part of M4
L5	Osc. Coil						Part of M4
L6	Input IF	2090492-2					
L7	Output IF	2090237-5					
L8	RF Choke	2090671-1	19-1003	BC-564	4608		3.9 Microhenries, IRC Part #CL-1
L9	"A" Lead Choke	216188-14					

TRANSFORMER (DRIVER)

ITEM No.	TURNS RATIO		REPLACEMENT DATA						NOTES
	PRI.	SEC.	BENDIX PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T1	5 :	1	2090265-2						

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA							NOTES
	PRI.	SEC.	BENDIX PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T2	50Ω CT	3-4Ω	2090266-2							

SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	BENDIX PART No.	QUAM PART No.	
SP1	6" x 9"	PM	3-4Ω	282634-7	69A2	Front Seat
SP2	6" x 9"	PM	3-4Ω	282634-8	69A2	Rear Seat

COMPONENT COMBINATIONS

ITEM No.	USE	DESCRIPTION	BENDIX PART No.	REPLACEMENT DATA
K1	RF Amp. Circuit	50000mmf, 100K, 22meg, 33meg	2090797-1	
K2	Audio Circuit	470mmf, 1000mmf, 1000mmf, 470Ω, 10K, 47K, 150K, 470K	2090798-1	
K3	AGC Circuit	10Ω, 18Ω, 2.2meg, 2.2meg	2090799-1	

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			BENDIX PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M1	SFE	9A 32V	SFE-9	221634-9				
M2	3AG			2090506-1				

MISCELLANEOUS

ITEM No.	PART NAME	BENDIX PART No.	NOTES
M3	Lamp	1892	#1892
M4	Tuner	2090453-2	Assembly, Includes L1, L4, L5, M5
M5	Switch	2090555-1	Power On-Off, 4PST, Slide Type (Part of M4)
	Foot Switch	2090403-3	
M6	Switch	2090673-1	Motor Reversing, Part of motor mounting plate assembly (Part #2090673-1)
M7	Switch	2090678-1	Seek-Sensitivity, Includes escutcheon
	Switch Assembly	2090677-1	Seek, Includes tuner mounting bracket, pointer pivot, lamp holder
M8	Relay Assembly	2090507-1	Includes mounting board assembly
M9	Clutch Assembly	2090046-3	Magnetic
M10	Motor	2090533-1	Tuner Drive
	Printed Board	2090790-1	Audio Chassis
	Printed Board	2090884-1	Small
	Printed Board	2090883-1	Large

CABINETS & CABINET PARTS

(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

NAME	PART NO.	DESCRIPTION
Knob Assembly	2090282-1	
Disc	2090278-1	Tone, Fader Control
Pushbutton	2090279-1	Less Cap, 6 Used
Pushbutton Cap	2090280-1	Station, 5 Used
Pushbutton Cap.	2090280-2	Off
Cover Assembly	2090763-2	Top
Cover Assembly	2090764-1	Bottom
Pointer	2090674-1	Includes arm and connecting stud assembly
Dial	2090330-1	Calibrated

WIRING DATA

General-use Unshielded Hook-up Wire ..... Use BELDEN No. 8530 (Solid) Available in Ten Colors
8524 (Stranded) Available in Ten Colors
Shielded Hook-up Wire ..... Use BELDEN No. 8885
Bonding Strap ..... Use BELDEN No. 8661

PHOTOFACT® Folder with CIRCUITRACE®

MOTOROLA MODELS X17B, X17N, X17R (Ch. HS-798)

MOTOROLA MODELS X17B, X17N, X17R (Ch. HS-798)

MOTOROLA MODELS X17B, X17N, X17R (Ch. HS-798)

TRADE NAME	Motorola Models X17B, X17N, X17R (Ch. HS-798)
MANUFACTURER	Motorola Inc., 4545 W. Augusta Blvd., Chicago 51, Illinois
TYPE SET	Battery Operated Transistorized Portable AM Receiver
POWER SUPPLY	6 Volts DC
TUNING RANGE—BROADCAST	535 — 1620KC
RATING	7MA @ 6 Volts DC (No Signal, Min. Volume) 20MA @ 6 Volts DC (Signal, Normal Volume)

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading.

Suggested Alignment Tools:
A1 thru A4.... GENERAL CEMENT #5004, 5009, 8195, 8274, 8275, 8607, 8728, 8987, 8988, 8989, 9291
WALSCO #2515, 2520, 2522, 2523, 2531, 2532, 2534, 2537, 2538
A5..... GENERAL CEMENT #9296, 9297
WALSCO #2546, 2547
A6, A7..... GENERAL CEMENT #5000, 5003, 5066, 8276, 8290, 9087, 9089
WALSCO #2512, 2525, 2528

	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	Loop	455KC (400~ Mod.)	Tuning gang fully open.	Across voice coil.	A1, A2, A3, A4	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
2.	"	532KC	Tuning gang fully closed.	Across voice coil.	A5	"
3.	"	1620KC	Tuning gang fully open.	Across voice coil.	A6	"
4.	"	1400KC	1400KC Signal	Across voice coil.	A7	"
5.	"	600KC	600KC Signal	Across voice coil.	A8	Adjust for maximum output. Repeat Steps 2 thru 5.

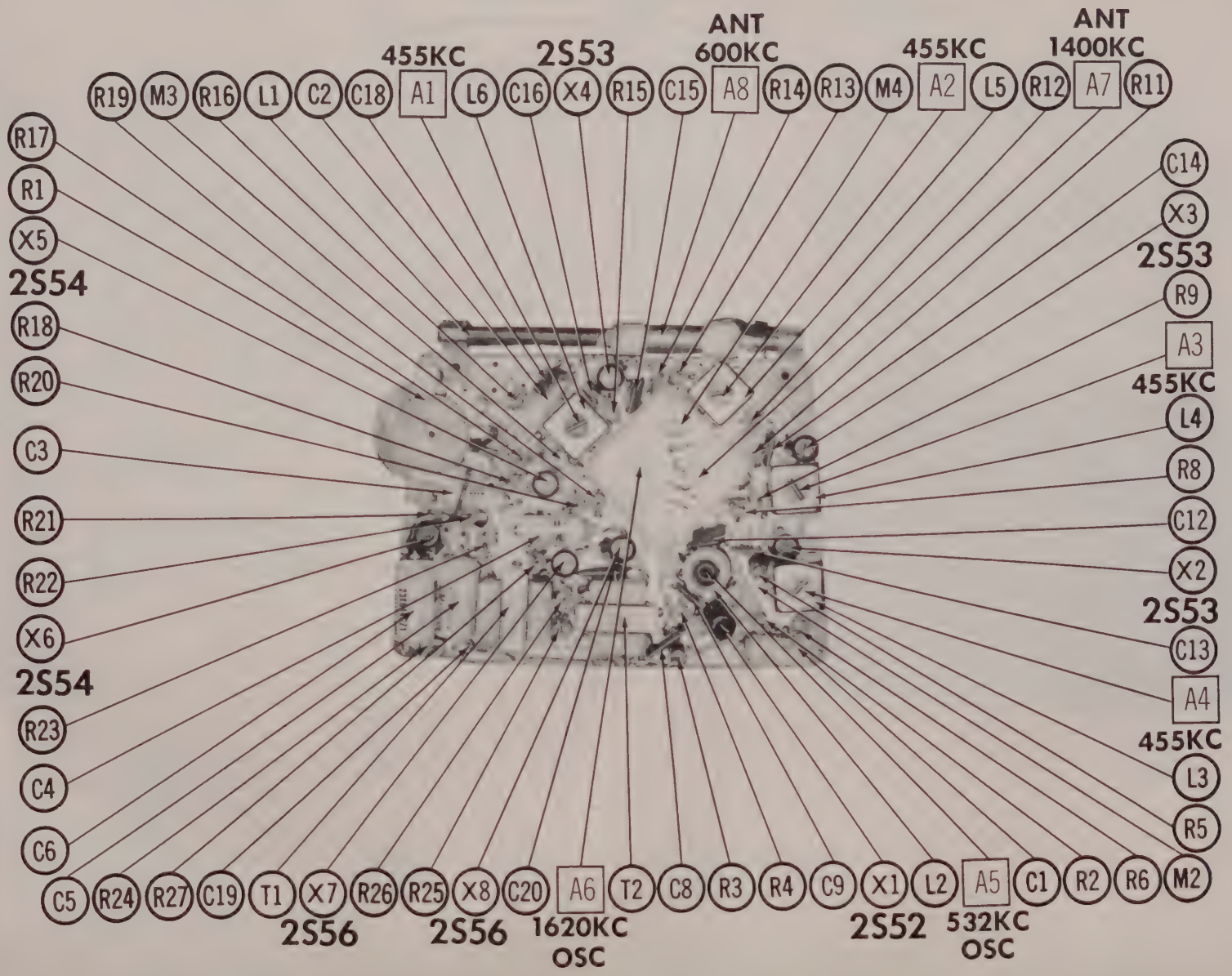
DISASSEMBLY

1. Loosen screw on cabinet back (Screw is captive). Remove back.
2. Remove 2 chassis mounting screws.
3. Slide chassis to right side and remove.

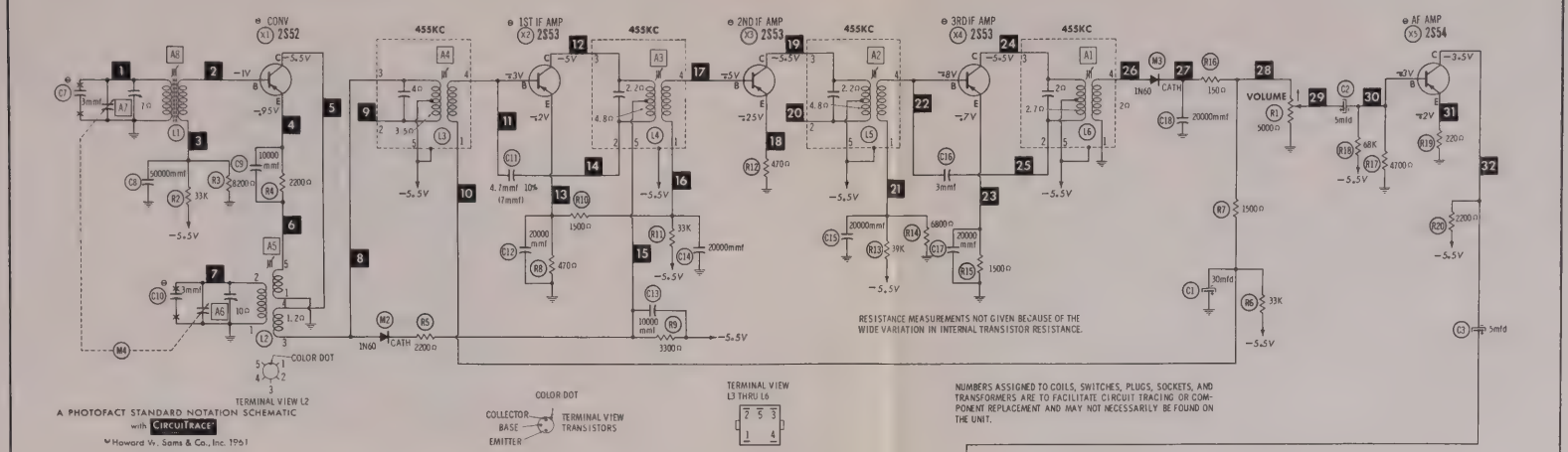
HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

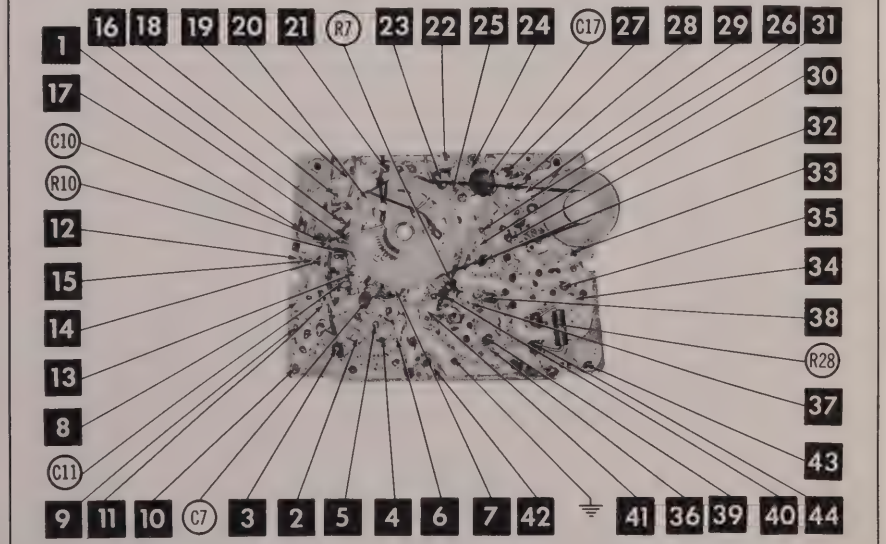
The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed. Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. © 1961 Howard W. Sams & Co., Inc., Indianapolis 6, Indiana. Printed in U.S. of America

KF311



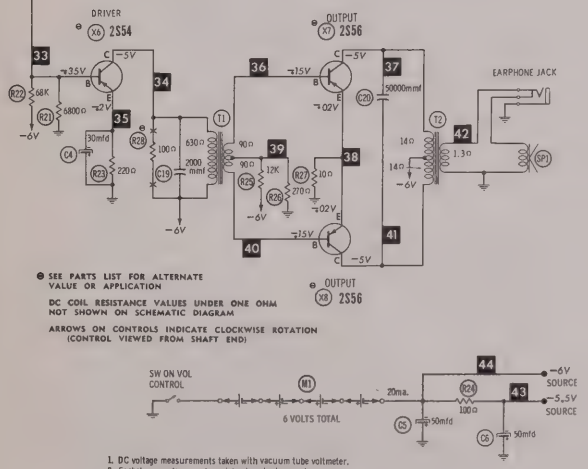
CHASSIS TOP VIEW





A Howard W. Sams CIRCUITRACE Photo

PRINTED BOARD


DRIVER
X6 2S54
OUTPUT
X7 2S56
OUTPUT
X8 2S56
EARPHONE JACK
SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION
DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM
ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (CONTROL VIEWED FROM SHAFT END)

1. DC voltage measurements taken with vacuum tube voltmeter.
2. Socket connections or transistor terminals are shown as bottom views.
3. Measured values are from socket pin or terminal to common ground.
4. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.
5. Volume control at maximum, no signal applied for voltage measurements.

MOTOROLA MODELS X17B, X17N, X17R (Ch. HS-798)

PARTS LIST AND DESCRIPTIONS

TRANSISTORS

ITEM No.	ORIG. TYPE	USE	REPLACEMENT DATA			NOTES
			RCA PART No.	RAYTHEON PART No.	SYLVANIA PART No.	
X1	2S52①	Converter	2N412	2N486	2N411	PNP
X2	2S53②	1st IF Amplifier	2N410	2N483	2N410	PNP
X3	2S53②	2nd IF Amplifier	2N410	2N483	2N410	PNP
X4	2S53②	3rd IF Amplifier	2N410	2N483	2N410	PNP
X5	2S54③	AF Amplifier	2N408	2N362	2N408	PNP
X6	2S54③	Driver	2N408	2N362	2N408	PNP
X7	2S56④	Output	2N408	2N632	2N408	PNP
X8	2S56④	Output	2N408	2N632	2N408	PNP

① Alternate Type 2SA52 ② Alternate Type 2SA53 ③ Alternate Type 2SB54 ④ Alternate Type 2SB56.

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP.	VOLT.	MOTOROLA PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	
C1	30	3	23K644668	PTT-3030	NLW30-6	TT6X30	ML30-3	TE-1092	
C2	5	3	23K644669	XPP-3005	NLW5-6	TT6X5	ML5-3	TE-1052.2	
C3	5	3	23K644669	XPP-3005	NLW5-6	TT6X5	ML5-3	TE-1052.2	
C4	30	3	23K644668	PTT-3030	NLW30-6	TT6X30	ML30-3	TE-1092	
C5	50	10	23K644671	PTT-10050	NLW50-10	TT10X50	ML50-12	TE-1119	
C6	50	10	23K644671	PTT-10050	NLW50-10	TT10X50	ML50-12	TE-1119	

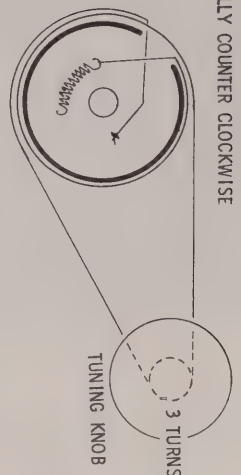
FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA					
			AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C7	3	Note 1	NPO-DI 3.0	DTZ-3R3	C10V3C	CCTO-3R3	CNO-533	10TCC-V33
C8	50000		C80V503AM	DA-503	H-05S5		TA-150	TG-S50
C9	10000		C80V103AM	DM-103	H-05S1		TA-110	TG-S10
C10	3	Note 1	NPO-DI 3.0	DTZ-3R3	C10V3C	CCTO-3R3	CNO-533	10TCC-V33
C11	4.7 10%	(7) †	NPO-SI 4.7	TCZ-4R7	C10V47C	CCTO-4R7	CNO-547	10TCC-V47
C12	20000		C80V203AM	DA-203	H-05S2		TA-120	TG-S20
C13	10000		C80V103AM	DM-103	H-05S1		TA-110	TG-S10
C14	20000		C80V203AM	DA-203	H-05S2		TA-120	TG-S20
C15	20000		C80V203AM	DA-203	H-05S2		TA-120	TG-S20
C16	3		NPO-DI 3.0	DTZ-3R3	C10V3C	CCTO-3R3	CNO-533	10TCC-V33
C17	20000		C80V203AM	DA-203	H-05S2		TA-120	TG-S20
C18	20000		C80V203AM	DA-203	H-05S2		TA-120	TG-S20
C19	2000		DI-2000	DM-202	BYA10D2	CCD-202	GP220	10TS-D20
C20	50000		C80V503AM	DA-503	H-05S5		TA-150	TG-S50

Note 1. Not used in some versions.
† Alternate Value.

TUNING DRIVE CORD STRINGING



PARTS LIST AND DESCRIPTIONS (Continued)

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	MOTOROLA PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	CTS-IRC PART No.	MALLORY PART No.	
R1	5000Ω	1/10	18B646634	B16-214				Volume & Switch

RESISTORS (IRC or EQUIVALENT)

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REMARKS
R2	33K	
R3	8200Ω	
R4	2200Ω	
R5	2200Ω	
R6	33K	
R7	1500Ω	
R8	470Ω	
R9	3300Ω	
R10	1500Ω	

ITEM No.	RATING	REMARKS
R11	33K	
R12	470Ω	
R13	39K	
R14	6800Ω	
R15	1500Ω	
R16	150Ω	
R17	4700Ω	
R18	68K	
R19	220Ω	

ITEM No.	RATING	REMARKS
R20	2200Ω	
R21	6800Ω	
R22	68K	
R23	220Ω	
R24	100Ω	
R25	12K	
R26	270Ω	
R27	10Ω	
R28	100Ω	Note 1

Note 1. Not used in some versions.

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA				NOTES
		MOTOROLA PART No.	Merit PART No.	Miller PART No.	Stancor PART No.	
L1	Loopstick	24B646697				
L2	Osc. Coil	24K646679				
L3	1st IF Trans.	24C646136				
L4	2nd IF Trans.	24K646566				
L5	3rd IF Trans.	24K646566				
L6	4th IF Trans.	24K646138				

TRANSFORMER (DRIVER)

ITEM No.	TURNS RATIO		REPLACEMENT DATA					NOTES
	PRI.	SEC.	MOTOROLA PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T1	1.8	1	25B646174					

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA					NOTES
	PRI.	SEC.	MOTOROLA PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T2	350Ω CT	6-8Ω	25B646133					

SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	MOTOROLA PART No.	QUAM PART No.	
SP1	3½"	PM	6-8Ω	50C646308		

BATTERIES

ITEM No.	VOLTAGE	MOTOROLA PART No.	REPLACEMENT DATA						NOTES
			BURGESS		EVEREADY		MALLORY		
			"A"	"B"	"A"	"B"	"A"	"B"	
M1	1.5V			930 *		1015 *		M-15R*	* 4 Required

CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA			NOTES
		MOTOROLA PART No.	RAYTHEON PART No.	SYLVANIA PART No.	
M2	1N60	48K644681	1N60	1N60	AVC (Pigtail)
M3	1N60	48K644681	1N60	1N60	Detector (Pigtail)

MISCELLANEOUS

ITEM No.	PART NAME	MOTOROLA PART No.	NOTES
M4	Tuning Cap.	19B646309	2 Gang
	Printed Board	84C646380	Less All Components

CABINETS & CABINET PARTS

(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

NAME	PART NO.	DESCRIPTION
Scale	34C646332	Dial
Knob	36B646312	Tuning
Knob	36B646327	Volume
Cabinet	1V60030A42	Back, Blue, Model X17B
Cabinet	1V60030A43	Back, Brown, Model X17N
Cabinet	1V60030A44	Back, Red, Model X17R
Cabinet	16K646297	Front, Blue, Model X17B
Cabinet	16E646131	Front, Brown, Model X17N
Cabinet	16K646299	Front, Red, Model X17R
Handle	55K646389	Blue, Model X17B
Handle	55C646388	Brown, Model X17N
Handle	55K646390	Red, Model X17R

WIRING DATA

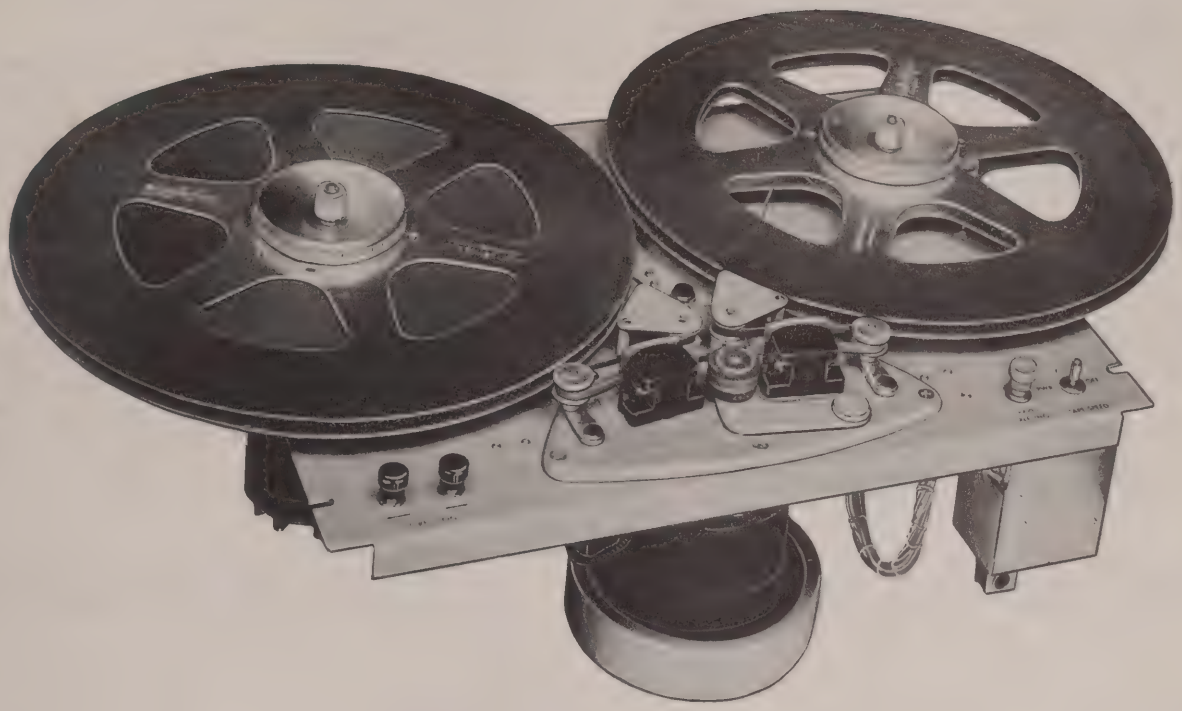
General-use Unshielded Hook-up Wire ..... Use BELDEN No. 8530 (Solid) Available in Ten Colors
8524 (Stranded) Available in Ten Colors

PHOTOFACT* Folder

EIA MEMBER ELECTRONIC INDUSTRIES ASSOCIATION

MAGNECORD MODELS
816 Series, 817 Series

MAGNECORD MODELS
816 Series, 817 Series



MAGNECORD MODELS
816 Series, 817 Series

GENERAL INFORMATION

The Magnecord Model 816, with "latch-on" preamplifier chassis, is a long-term tape reproducer designed for continuous operation. It accommodates 14-inch reels and operates at tape speeds of either 7 1/2 or 3 3/4 inches per second. Two heads provide tape playback in either direction. Reversal of tape travel is manual or automatic for continuous operation.

The Magnecord Model 817 transport mechanism is identical to the Model 816 transport except the Model 817 has no AC power cord. The Model 817, with "latch-on" record bias oscillator chassis, is a long-term record and reproduce unit when used along with a PT6 amplifier. The Model 817 transport is used as the recorder mechanism in the 817RP and 817DL long-term recorder systems.

These units are designed to operate on 60 cycle, 117 volts, AC supply only. Before connecting to your line supply, be absolutely certain that it agrees with the above specifications.

Manufactured by:

Magnecord
Division Of Midwestern Instrument, Inc.
41st Street And Sheridan Road
Tulsa, Oklahoma

This material compiled and published by

HOWARD W. SAMS & CO., INC., INDIANAPOLIS 6, INDIANA
C376

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SPECIFICATIONS

Tape Transport

Tape Speeds:
7-1/2 or 3-3/4 inches per second. Changed by switch.

Starting Time:
Less than 0.1 second.

Stopping Time:
Less than 2 inches at 7-1/2 inches per second.

Fast Wind:
Rapid reeling switch for fast tape wind in either direction.

Frequency Response:
50 to 10,000 cps at 7-1/2 inches per second. 50 to 5,000 cps at 3-3/4 inches per second.

Dimensions:
Depth, 9 inches; height, 14 inches; width, 19 inches.

Mounting:
In standard 19-inch relay rack or console.

Three-Motor System:
2-speed, 600-rpm and 1200-rpm, hysteresis synchronous drive motor. Two torque motors provide tape tension for supply and take-up reels. Reel spindles are attached directly to torque motor shafts. Solenoid-controlled differential brakes operate on brake drums mounted on reel flanges. Tape tension is fixed for minimum maintenance.
Direction of all motors is controlled by relays operated by manual or automatic switches.

Tape Break Switches:
Tape break switches stop mechanism if tape breaks or spills.

Two Half-Track Heads:
Two half-track heads for playback or record, one for each direction tape travels. A relay selects head to correspond with tape travel.
Playback heads used in Model 816 reproducer
Record-playback heads used in Model 817 long-term storage recorder.

Preamplifier Chassis (Model 816)

Preamplifier chassis latches to transport mechanism back for use as a playback unit. It contains playback preamplifier, motor capacitors, relays and power supplies for operating preamplifier and transport mechanism.

Tubes:
1-12AY7, 2-12AX7, 1-6X4, 12AY7, and 12AX7 filaments heated by 12 VDC. 6X4 filament heated by 6.3 VAC.

Output Impedance:
Approximately 5,000 ohms.

Record Bias Oscillator Chassis (Model 817)

Record bias oscillator chassis latches to transport mechanism back for use as bias supply unit for recording with a PT6 amplifier. Contains recording bias oscillator, motor capacitors and relays. Does not provide erase current, as no erase heads are included on transport mechanism.

Tube:
1-12AU7

OPERATING INSTRUCTIONS

Model 816 With Preamplifier for Tape Reproduction

The Model 816 operates with preamplifier for tape reproduction only. The preamplifier output is connected to a music system input. Plug AC power cord into a 117-VAC outlet. The PWR OFF-SPEED switch is kept in OFF position. Proceed with Step 1 under "Threading the Tape".

Model 817

The Model 817 operates with the record bias oscillator for recording on tape or playback of tape with PT6 amplifier. The record bias oscillator power cable is plugged into the socket on the P63 voice-operated relay. The remote-control cable is connected from remote control socket on transport mechanism to Start terminals 1 and 2 on voice-operated relay. The audio cable is connected from connector (Cannon) on record bias oscillator to record connector (Cannon) on PT6-6 amplifier. The control cable is connected from PT6-6 amplifier 4-ohm terminals to P63 voice-operated relay input. The AC power cord

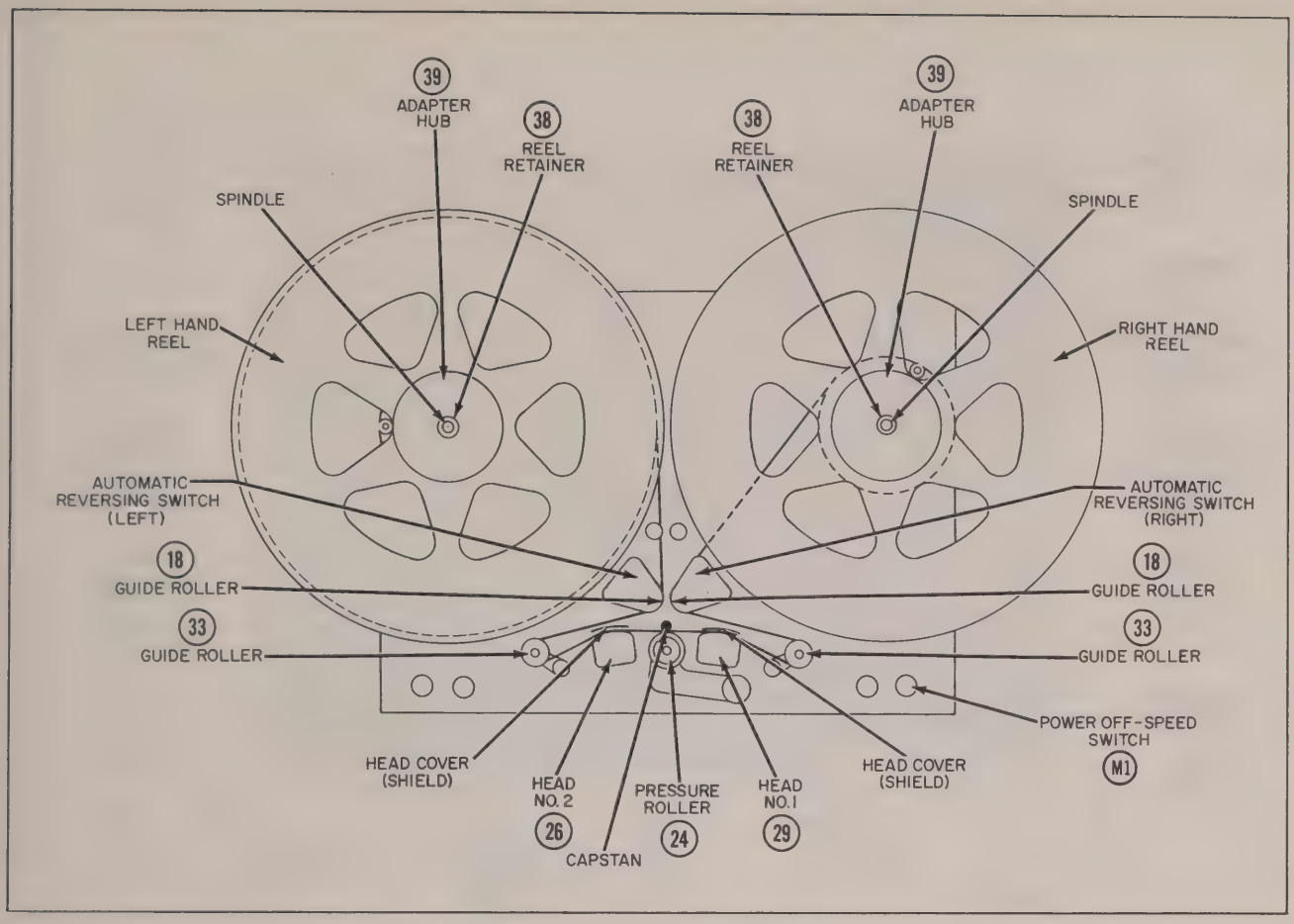

Fig. 1. Tape Threading Diagram

on PT6-6 amplifier is plugged into a 117-VAC outlet. PWR OFF-SPEED switch is kept in OFF position until tape is threaded. Proceed with Step 1 under "Threading The Tape."

Threading the Tape

Referring to Fig. 1, thread tape as follows:

1. Place PWR OFF-SPEED switch M1 in OFF position.

2. Remove reel retainer (38) and adapter hub (39) from left-hand reel spindle. Reel retainer is pushed in, rotated counterclockwise, then pulled off reel spindle.

3. Place adapter hub in center hole of a full 14-inch reel of tape with free end of tape at right-hand side, so tape will unwind in clockwise direction. Make sure key pin on hub fits into key notch in reel.

4. Place reel and hub on left-hand spindle. Secure with reel retainer.

5. Place empty tape reel and hub on right-hand reel spindle. Secure with reel retainer.

6. Run free end of tape directly from full reel to empty reel on right-hand spindle.

7. Secure end of tape to empty reel. Manually rotate empty reel clockwise to wind several turns of tape on empty reel.

8. Unwind three or four feet of tape by rotating left-hand reel clockwise.

9. As shown in Fig. 1, run tape between automatic reversing switches and around each tape guide roller (18) and (33). Lift each head cover and place tape between covers and heads (26) and (29). Place tape between capstan and pressure roller (24).

10. Carefully take up slack by turning right-hand reel clockwise. Make certain tape passes between pressure roller and capstan, and is not twisted.

CAUTION: PWR OFF-SPEED switch must be in OFF position to prevent mechanism from starting while threading the tape, to avoid the possibility of breaking or stretching the tape.

Starting Transport Mechanism (Model 816)

1. Turn left-hand reel counterclockwise until all tape slack is taken up to close Tape Break switches. Tape Break switch arms should be in vertical position.

2. Throw PWR OFF-SPEED switch (M1) to 7-1/2 or 3-3/4 position. Transport mechanism will now start operating.

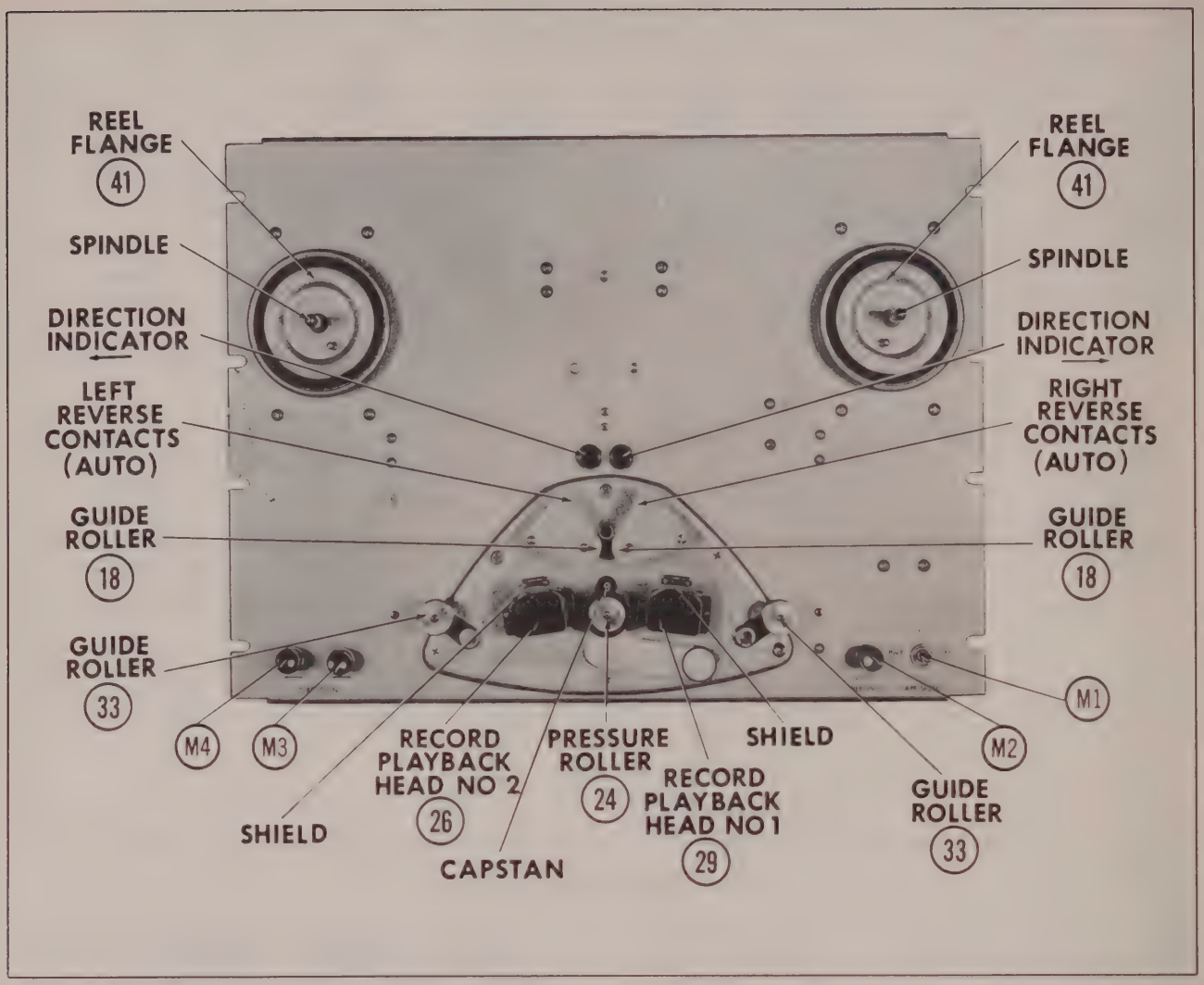

Fig. 2. Top View of Transport Mechanism.

3. Check direction indicators to determine if transport is set for direction tape must travel. If necessary, press correct DIRECTION switch (M3) or (M4).

4. Transport will now operate continuously (reversing direction when end of reel is reached because of the metallic foil strips at each end of tape) until power is switched off or tape breaks.

Starting Transport Mechanism (Model 817)

Power to start mechanism is controlled by a P63 voice-operated relay, PT6 amplifier or other associated equipment. Starting procedure is the same as for Model 816 except application of power. Sufficient tension must be maintained on tape to close Tape Break switches on compliance arms. PWR OFF-SPEED switch must be set for desired speed. Otherwise, mechanism will not start when power is applied by associated equipment.

Rapid Reeling (Model 816)

Tape can be moved at high speed in either direction, by rapid reeling as follows:

1. PWR OFF-SPEED switch is thrown to PWR OFF position.

2. Tape is removed from heads and tape quide rollers. Rotate either reel so tape is taut and runs directly from reel to reel.

3. Throw PWR OFF-SPEED switch to either 7-1/2 or 3-3/4 position. Check DIRECTION indicator. Press correct DIRECTION switch, if necessary, for proper tape travel.

4. Depress RAPID REELING switch until desired amount of tape has been transferred.

Rapid Reeling (Model 817)

Rapid reeling on Model 817 is identical with procedure for Model 816 except power is controlled through associated equipment.

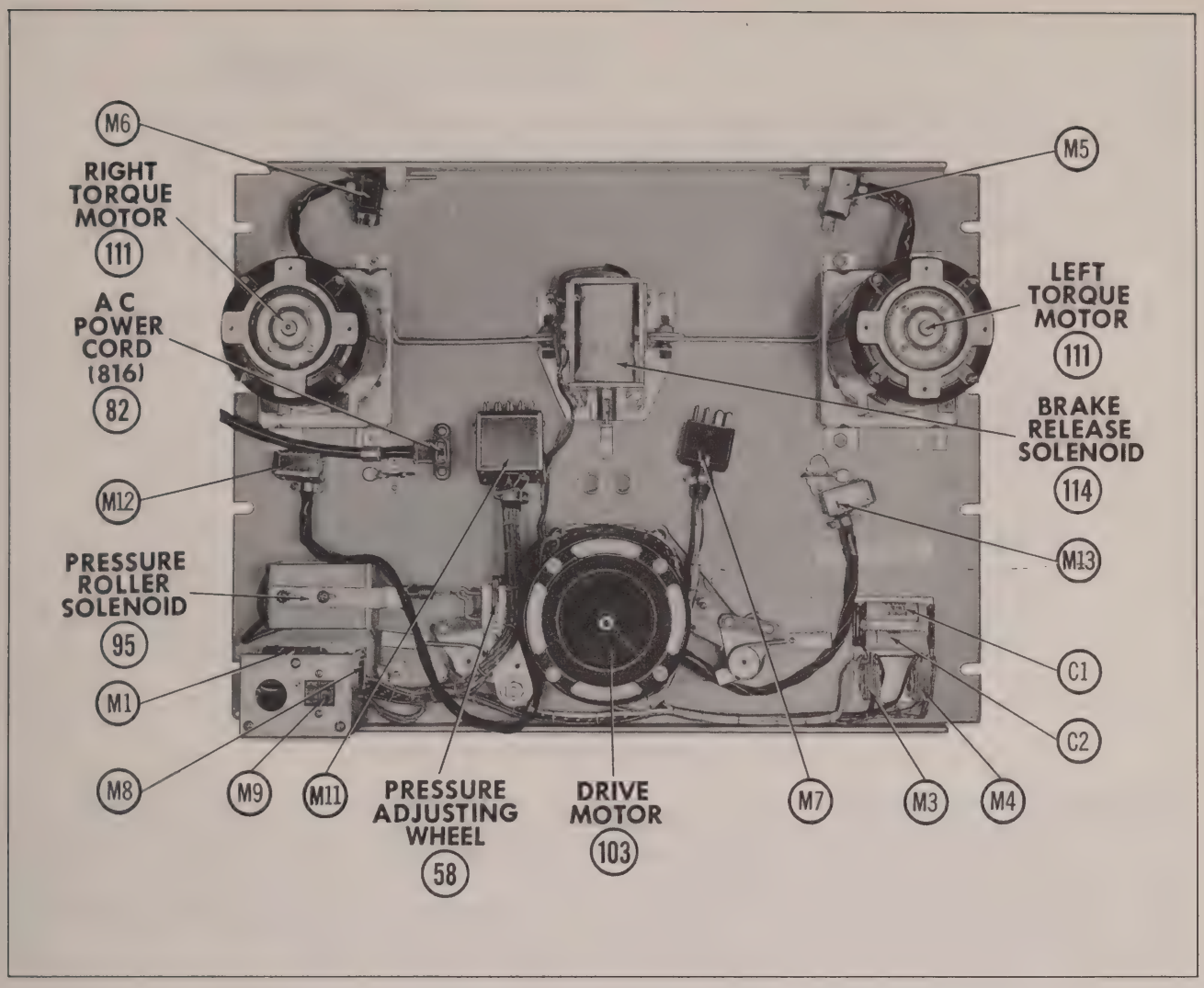

Fig. 3. Bottom View of Transport Mechanism.

ADJUSTMENTS

Head Alignment (Azimuth)

Heads are accurately aligned at the factory. Azimuth adjustments should be made if heads have been replaced or head alignment has been disturbed.

Azimuth alignment is made as follows:

1. A standard alignment tape is required. Suitable tape can be obtained from Magnecord dealers.

2. A sensitive AC voltmeter, with good high-frequency response and 0-5 or 0-10 volt scale is connected to output terminals of preamplifier with the Model 816. The AC voltmeter is connected to the output terminals of the record-playback amplifier, in playback position, when heads are aligned on Model 817.

3. Alignment tape is threaded and tape transport operated for playback with tape traveling from left to right.

4. Adjust head alignment screw on left-hand head (Head No. 2) for maximum meter reading during azimuth test signal playback.

5. Operate transport mechanism so tape travels from right to left, and adjust head alignment screw on right-hand head (Head No. 1) for maximum meter reading.

Pressure Roller

Tension of pressure roller return spring (56) applied to pressure roller arm (36) holds pressure roller (24) away from the capstan when pressure roller solenoid (95) is not energized. When mechanism is operating and pressure roller solenoid (95) is energized, pressure roller (24) is held in contact with capstan by actuator arm (59) and solenoid link spring (99) attached to plunger of pressure roller solenoid (95). Pressure roller pressure must be correct or tape speed will be uneven.

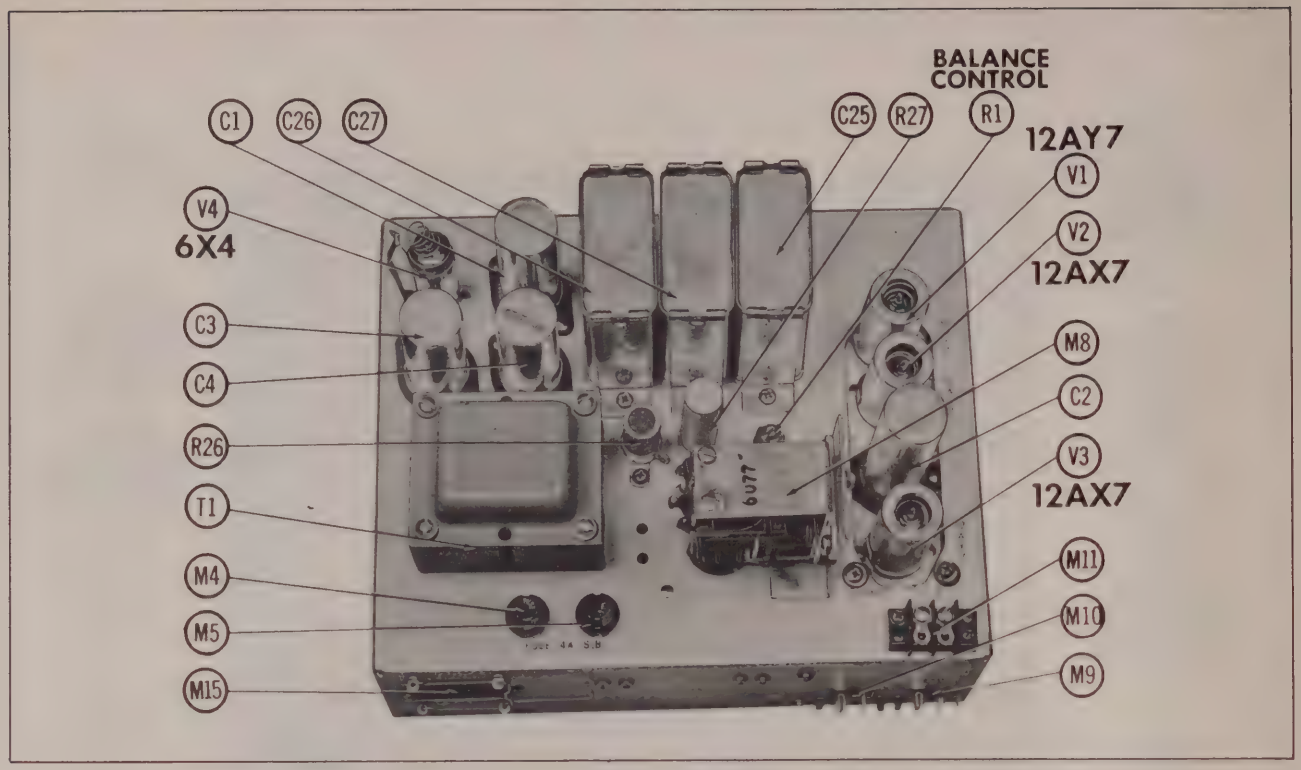

Fig. 4. Top View of Preamplifier Chassis.

Solenoid Stop Angle Adjustment

1. Loosen screws (102) and adjust plunger stop bracket (100) so solenoid link spring (99) is near but does not touch plunger stop bracket (100). When solenoid plunger (96) is in position occupied while solenoid (95) is energized, tighten screws (102) to hold adjustment.

Pressure Roller Adjustment

1. Adjust pressure adjust wheel (58) so pressure roller (24) lightly contacts capstan when pressure roller solenoid (95) is energized.

2. Thread tape and start mechanism. Reproduction will be abnormal due to uneven tape speed. Uneven tape speed is caused by insufficient pressure on pressure roller.

3. Turn pressure adjust wheel (58) to increase pressure of pressure roller (24) on capstan until sufficient to produce even tape speed and normal reproduction. Do not increase pressure beyond this point. Excessive pressure creates drag which produces abnormal reproduction.

Tape Break Arm and Switch

During normal operation, tape tension on tape guide roller (33) mounted on tape break arm (35) moves switch bar (52 or 55). This permits tape break micro switch (50) to close and mechanism to operate. If tape breaks mechanism stops because tension is removed from tape guide roller (33), permitting tape break spring (54) aided by weight mounted on switch bar (52 or 55) to drop tape break arm (35) and switch bar (52 or 55). This opens tape break switch (50), removing power to mechanism.

Adjust switch bar (52 or 55) to actuate tape break micro switch (50) when tape break arm (35) is in correct position.

Adjust tape break spring (54) for proper tension.

Switch Bar Adjustment

1. Loosen set screw (53) in hub of switch bar (52 or 55).

2. Place tape break arm against bottom stop pin.

3. Turn switch bar (52 or 55) on shaft of tape break arm (35) to where switch bar (52 or 55) actuates tape break micro switch (50).

4. Tighten set screw (53) in hub of switch bar (52 or 55) to secure adjustment.

Tape Break Spring Adjustment

Hook on end of tape break spring (54) is hooked in one of four holes in tape spring adjust bracket (77). This gives positive return action to tape break arm (35) when tape tension is removed. Adjust only enough spring tension to produce positive return action of tape break arm (35).

Brakes

Torque motors are equipped with balanced differential brakes. The differential in the braking action is more positive in one direction of motor rotation. Braking action is either fully applied or completely released and controlled by a spring-loaded solenoid. Brake bar spring (84) applies tension to

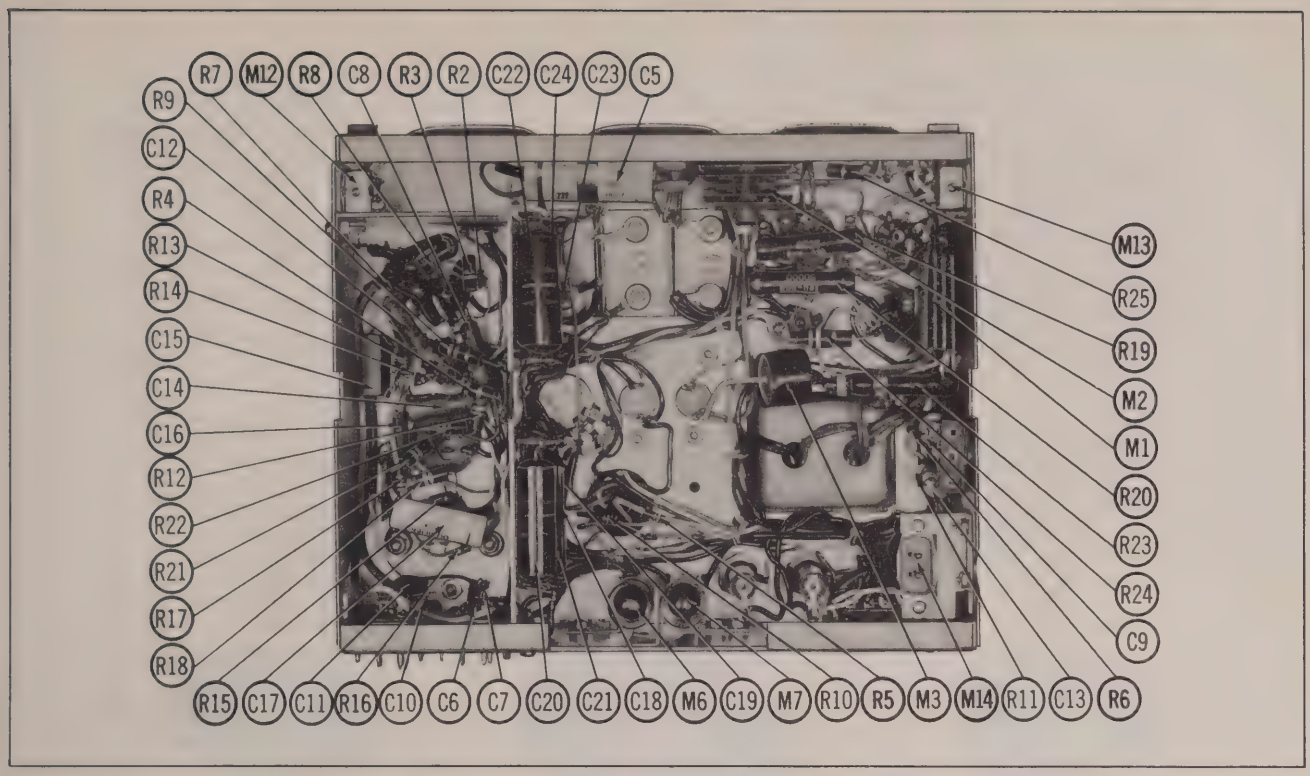

Fig. 5. Bottom View of Preamplifier Chassis.

brake bar (87) to hold brake linings (90) against brake drums (41) while brake release solenoid (114) is not energized. When brake release solenoid (114) is energized, brake bar (87) is moved against tension of brake bar spring (84). This moves brake linings (90) away from brake drums (41) and removes the braking action.

To adjust brakes:

1. Hold plunger (112) of brake release solenoid (114) in energized, brakes released, position.

2. Turn brake adjustment screws (83) in with Allen wrench until 1/16-inch clearance remains between each brake lining (90) and its associated brake drum (41).

3. Check take-up and supply brake tension. Take-up brake tension should read 24 to 28 in. oz. Supply brake tension 60 to 64 in. oz.

CLEANING

Any accumulation of foreign material on heads or other parts contacting the tape can cause serious loss in frequency response and in reproduction quality. Foreigh material, such as oxide coating worn off the tape, can be removed with a soft cloth moistened with ethyl alcohol. Carbon tetrachloride can be used as a cleaner, although not recommended. Detrimental effects may be produced on mechanical parts under certain conditions, as well as having a toxic effect on the user.

CAUTION: Do not use too much cleaning fluid. Ethyl alcohol or carbon tetrachloride can damage tape, parts, and finish.

Heads

Heads should be cleaned daily or weekly, depending on use, or as soon as any foreign matter is evident on pole pieces. Use the following procedure:

1. Remove tape from heads. Lift head covers.

2. Carefully wipe pole pieces with a soft cloth moistened with ethyl alcohol.

Pressure Roller, Tape Guide Rollers, and Automatic Reversing Switches.

Surfaces of pressure roller, tape guide rollers, and automatic reversing switches that contact tape should be cleaned at the same time heads are cleaned. Carefully wipe surfaces with soft cloth moistened with ethyl alcohol.

LUBRICATION

The following points should be oiled with two drops of SAE No. 20 oil every six months:

Torque Motors

Front and rear oil hole in each motor.

Drive Motor

Front oil hole.

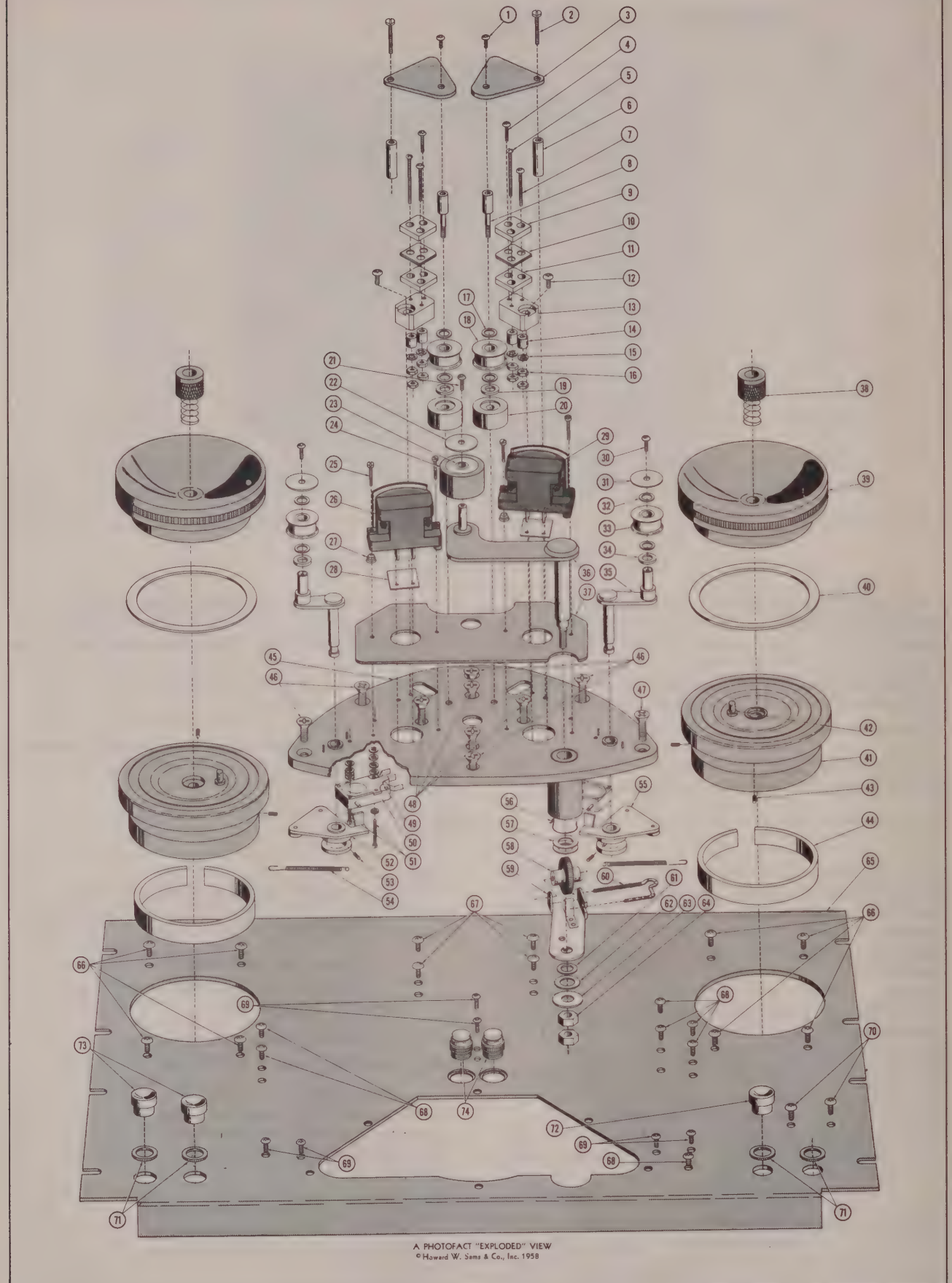

Fig. 6A. Exploded View of Parts Above Mechanism Plate.

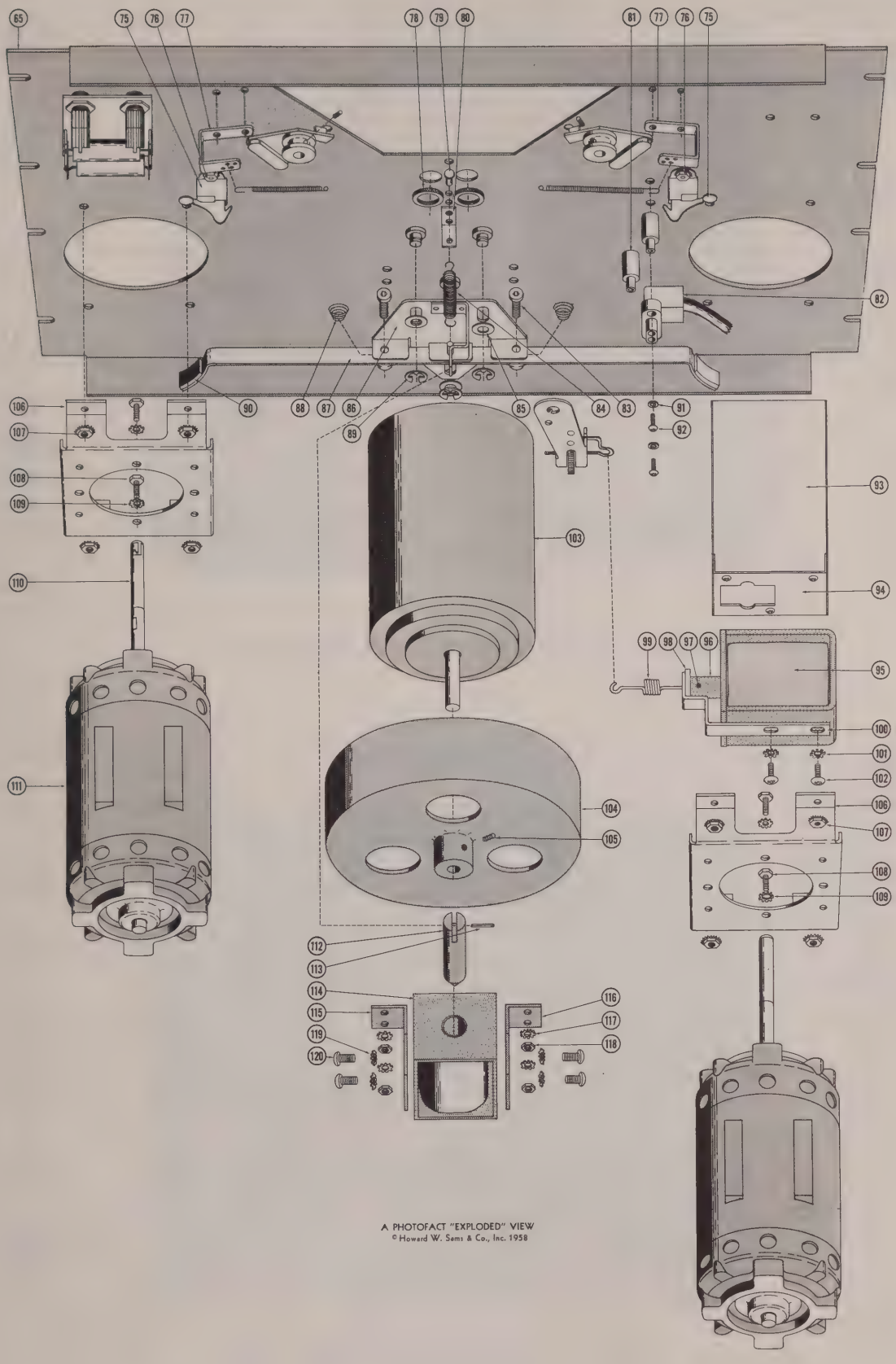

Fig. 6B. Exploded View of Parts Below Mechanism Plate.

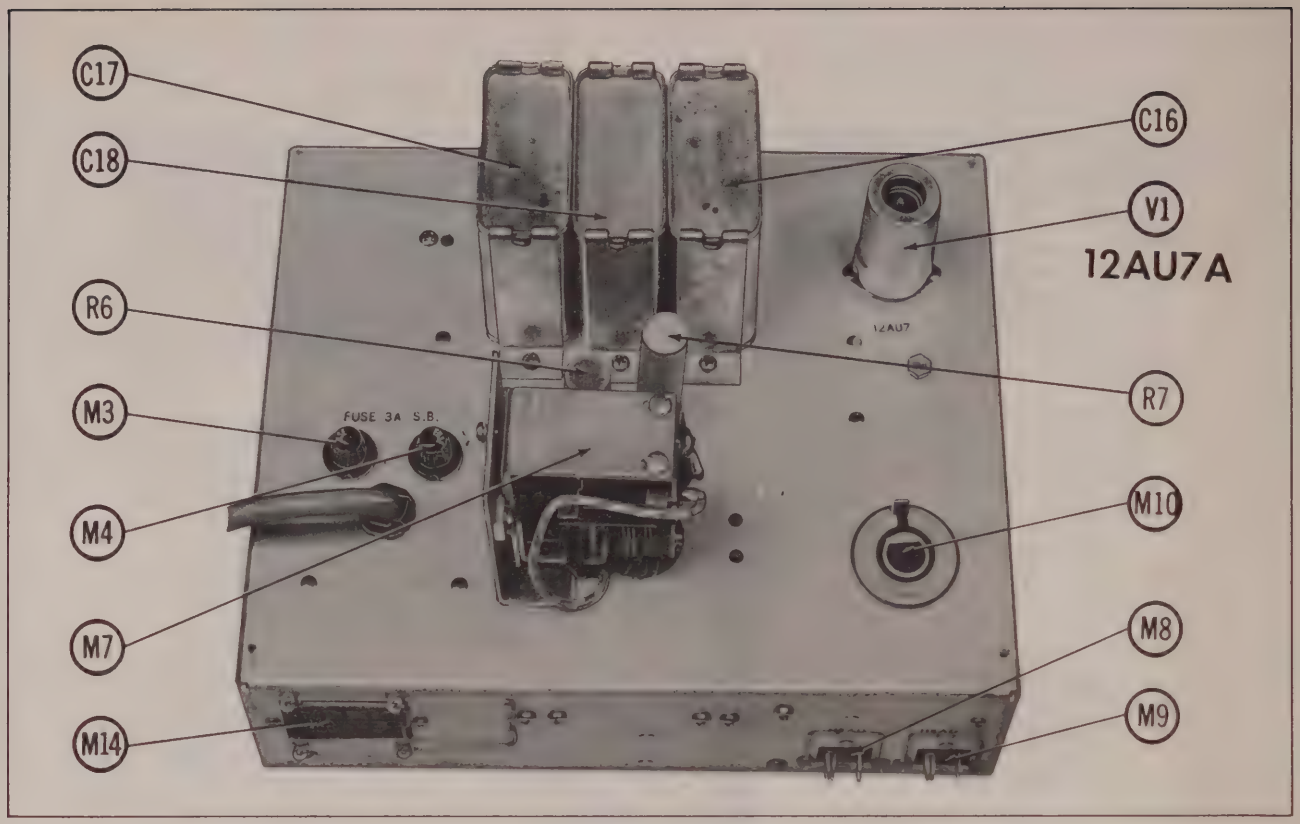

Fig. 7. Top View of Record Bias Oscillator Chassis.

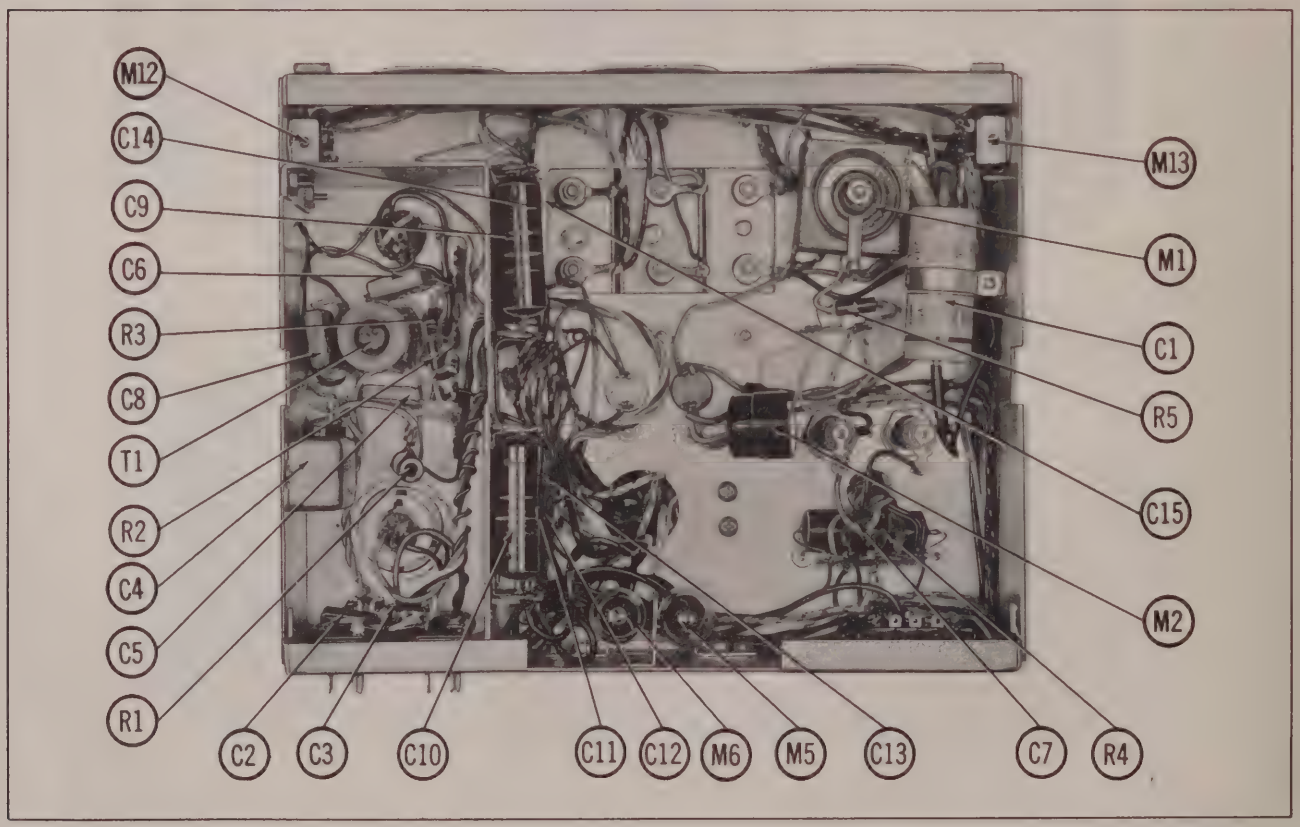

Fig. 8. Bottom View of Record Bias Oscillator Chassis.

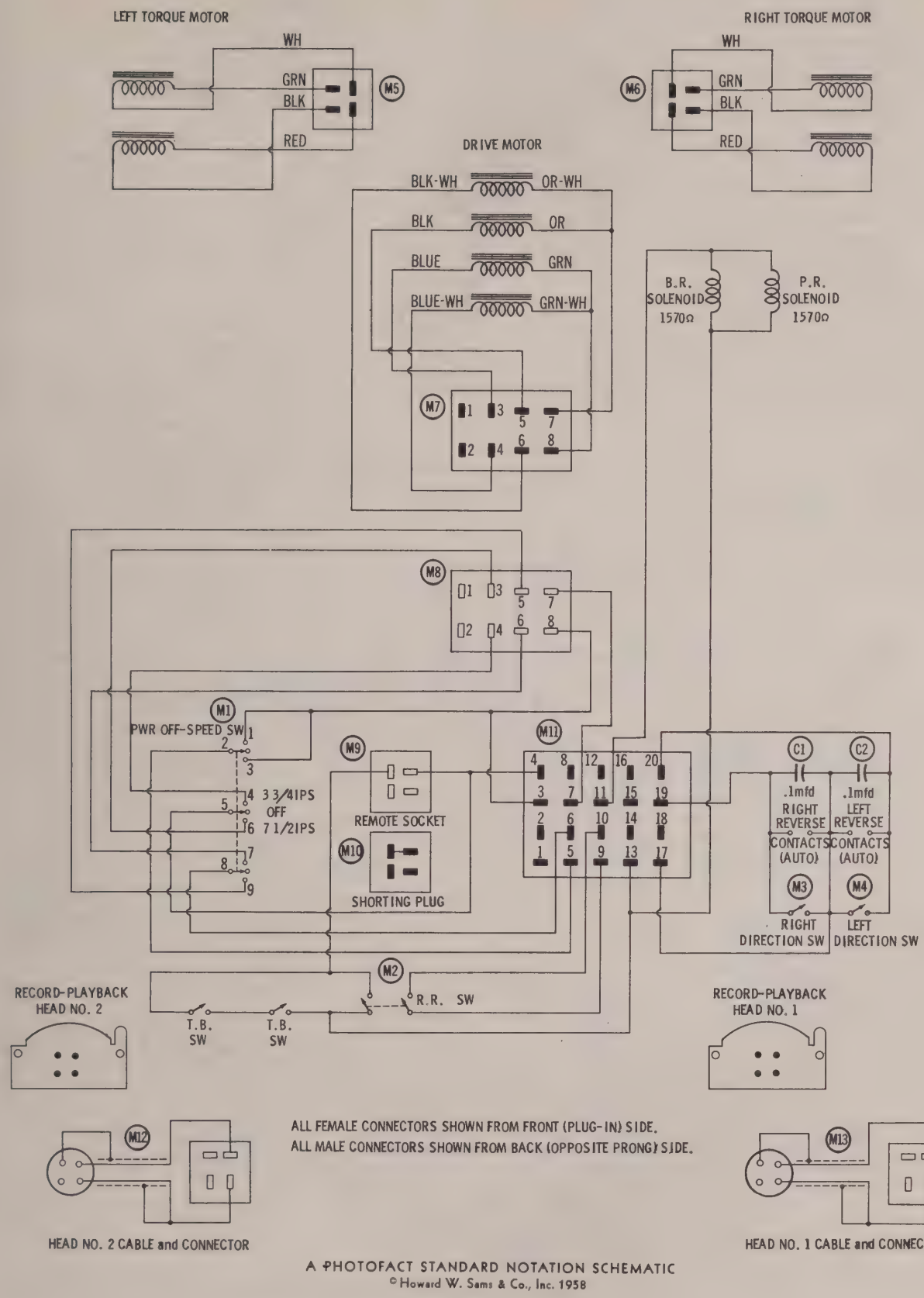

Fig. 9. Schematic Diagram of Tape Transport.

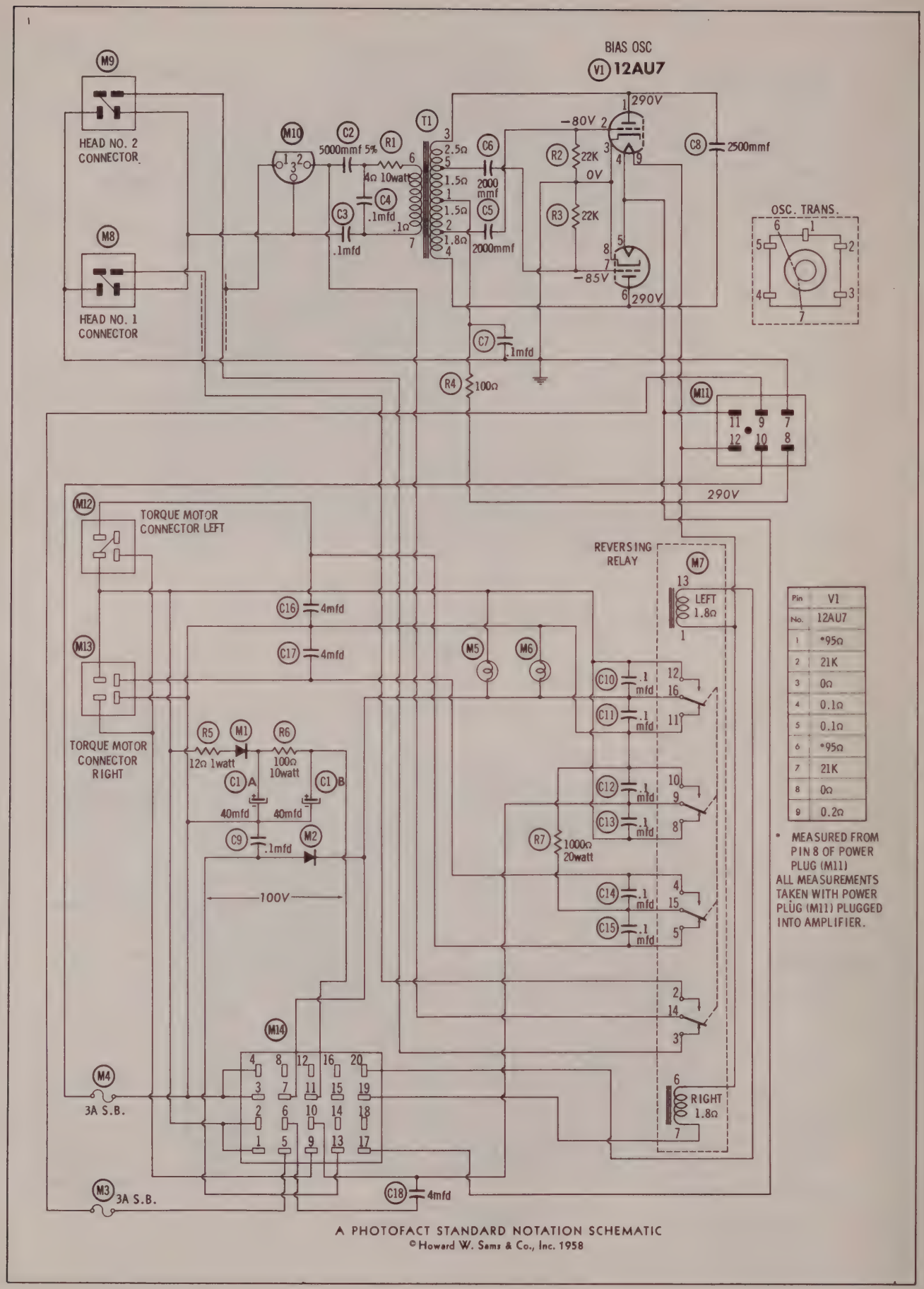

Fig. 10. Schematic Diagram of Record Bias Oscillator Chassis.

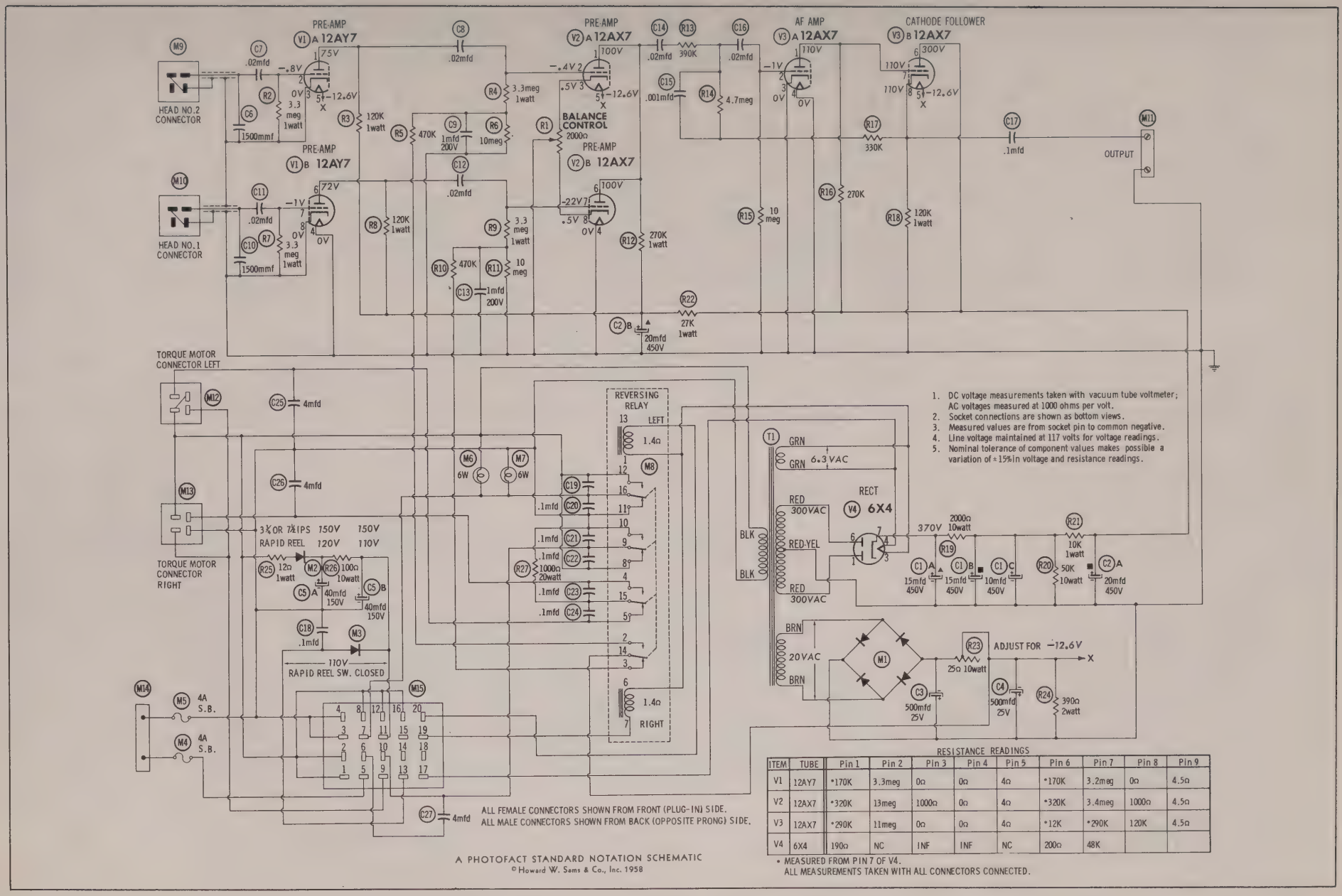
PRE-AMP V1A 12AY7
PRE-AMP V1B 12AY7
PRE-AMP V2A 12AX7
PRE-AMP V2B 12AX7
AF AMP V3A 12AX7
CATHODE FOLLOWER V3B 12AX7
BALANCE CONTROL 2000Ω
HEAD NO.2 CONNECTOR
HEAD NO.1 CONNECTOR
OUTPUT
TORQUE MOTOR CONNECTOR LEFT
TORQUE MOTOR CONNECTOR RIGHT
REVERSING RELAY
LEFT
RIGHT
RECT V4 6X4
3¾ OR 7½ IPS 150V 150V
RAPID REEL 120V 110V
110V RAPID REEL SW. CLOSED
ADJUST FOR −12.6V
4A S.B.
4A S.B.
ALL FEMALE CONNECTORS SHOWN FROM FRONT (PLUG-IN) SIDE.
ALL MALE CONNECTORS SHOWN FROM BACK (OPPOSITE PRONG) SIDE.
A PHOTOFACT STANDARD NOTATION SCHEMATIC
© Howard W. Sams & Co., Inc. 1958
1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance of component values makes possible a variation of ±15% in voltage and resistance readings.
RESISTANCE READINGS
ITEM | TUBE | Pin 1 | Pin 2 | Pin 3 | Pin 4 | Pin 5 | Pin 6 | Pin 7 | Pin 8 | Pin 9
V1 | 12AY7 | *170K | 3.3meg | 0Ω | 0Ω | 4Ω | *170K | 3.2meg | 0Ω | 4.5Ω
V2 | 12AX7 | *320K | 13meg | 1000Ω | 0Ω | 4Ω | *320K | 3.4meg | 1000Ω | 4.5Ω
V3 | 12AX7 | *290K | 11meg | 0Ω | 0Ω | 4Ω | *12K | *290K | 120K | 4.5Ω
V4 | 6X4 | 190Ω | NC | INF | INF | NC | 200Ω | 48K | | |
* MEASURED FROM PIN 7 OF V4.
ALL MEASUREMENTS TAKEN WITH ALL CONNECTORS CONNECTED.

Fig. 11. Schematic Diagram of Preamplifier Chassis.

MECHANICAL PARTS LIST

Item No.	Part No.	Description
1	61-4PB5	4-40 x 5/16" Phillips BHMS
2	61-4PB16	4-40 x 1" Phillips BHMS
3	71A166	Switch Cover Plate
4	61-4R8	4-40 x 1/2" RHMS
5	61-4R22	4-40 x 1 3/8" RHMS
6	75A122	Switch Cover Spacer
7	61-4R18	4-40 x 1 1/8" RHMS
8	76A8	Guide Roller Shaft
9	78A159	Switch Block (front)
10	89A50	Switch Insulator Strip
11	78A160	Switch Block (rear)
12	61-6PB10	6-32 x 5/8" Phillips BHMS
13	89A26	Switch Support
14	89A30	Switch Post Insulating Tube
15		#4 Lock Washer
16	624H4	4-40 x 1/4" Hex Nut
17	63X28	Fiber Washer
18	91A10	Roller & Bearing Assembly
19	63X29	Felt Washer
20	75A11	Guide Roller Spacer
21	61-4PB5	4-40 x 5/16" Phillips BHMS
22	71A663	Pressure Roller Washer 1 1/4 x .116 x .064
23	74A1	Pressure Roller Bearing
24	75A6	Pressure Roller
25	61-2FI12	2-56 x 3/4" FHMS.
26	91A1331	Half-Track Reproduce Head (Inside Track)
26A	91A942	Rec/Rep Head (Model 817)
27	77A25	Head Adjusting Spring
28	89A76	Fish Paper Insulator
29	91A1332	Half-Track Reproduce Head (Outside Track)
29A	91A941	Rec/Rep Head (Model 817)
30	61-4PB5	4-40 x 5/16" Phillips BHMS
31	63A5	Dural Washer, 7/8 x .116 x .062
32	63X28	Fiber Washer
33	91A10	Guide Roller & Bearing Assembly
34	63X29	Felt Washer
35	91B2156	Tape Break Arm & Shaft Assembly
36	91A2155	Pressure Roller Arm & Shaft Assembly
37	71A701	Head Shield Plate
38	91A5	Reel Retainer
39	73B15	Adapter Hub Assembly
40	89A101	Reel Flange Cushion
41	91B1962	Reel Flange & Brake Drum Assembly
42	75A471	Reel Stud
43	61-10SS4	10-32 x 1/4" Allen-Head Set Screw
44	86A117	Brake Drum Sponge Rubber Mute
45	91D2153	Tape Drive Frame & Bearing Assembly
46	61-10PFL18	10-32 x 1/2" Phillips Flat Head Screw
47	61-10PF12	10-32 x 3/4" Phillips Flat Head Screw
48	61-10PFL20	10-24 x 1 1/4" Phillips Flat Head Screw
49	75A525	Micro Switch Spacer
50	43X114	Micro Switch
51	61-25L12	2-56 x 3/4 Phillips Head Screw
52	91A2191	L.H. Switch Bar & Hub Staking Assembly
53	61-6SS4	6-32 x 1/4" Allen Set Screw
54	77A4	Tape Break Spring
55	91A2192	R.H. Switch Bar & Hub Staking Assembly
56	77A101	Pressure Roller Return Spring
57	63A226	9/16 x 3/8 Shim Washer (as needed)
58	75A515	Pressure Adjusting Wheel

Item No	Part No.	Description
59	91A2195	Actuator Arm & Spring Assembly
60	75A516	Solenoid Link Spring Adjusting Screw
61		Washer 1/2 x 5/16 x .005 Brass
62		Washer
63		Washer 3/4 x 5/16
64		Hex Nut
65	71D694	Front panel
66	61-8PB6	8-32 x 3/8" Phillips BHMS
67		6-32 x 5/16 Phillips BHMS
68		6-32 x 3/8" Phillips BHMS
69	61-4PB5	4-40 x 5/16" Phillips BHMS
70	61-8PB4	8-32 x 1/4" Phillips BHMS
71		15/32-32, Knurled Ring
72		Rapid Winding Pushbutton, Red
73		Direction pushbutton, Black
74	41A40	Direction Indicator Jewel
75	66A77	Chassis Latch
76		6-32 5/16" Nut
77	72A286	Spring Adjusting Bracket
78		Knurled Rings
79	67A88	Flat Head Pin
80	72A277	Brake Return Spring Bracket
81	75A514	AC Receptacle Mounting Stud
82	52X61	Line Cord
83	61-10CS14	10-32 x 7/8" Socket Head Cap Screw
84	77A89	Brake Bar Spring
85	63A103	Brass Washer-Shim
86	71A652	Brake Bar Slider
87	78A223	Brake Bar
88	77A91	Brake Adjusting Spring
89	67X73	.25" "E" Ring
90	89A99	Brake Lining
91		#6 Washer
92	61-6PB4	6-32 x 1/4" Phillips BHMS
93	91A2163	Switch Junction Box
94	71B702	Switch Junction Box Cover
95	31A44	Pressure Roller Solenoid
96	75A261	Solenoid Plunger
97	67X56	Roll Pin
98	86A124	Plunger Stop Rubber Mute
99	77A100	Solenoid Link Spring
100	71A590	Plunger Stop Bracket
101		#8 Lock Washer
102	61-8PB4	8-32 x 1/4" Phillips BHMS
103	35C69	Capstan Drive Motor
104	73B46	Flywheel
105	61-8SS6	8-32 x 3/8" Allen Set Screw
106	72A260	Motor Mounting Bracket
107	62X26	8-32 Kep Nut
108		10-24 x 3/8" Hex Head Machine Screw
109	63X108	#10 External Tooth Lockwasher
110	75A5	Spindle Nose
111	35C71	Torque Motor
112	75A261	Solenoid Plunger
113	67X56	3/32 x 1/2 Roll Pin
114	31A44	Brake Solenoid
115	72A262	Solenoid Bracket — Left
116	72A261	Solenoid Bracket — Right
117		#6 External Tooth Lockwasher
118		6-32 Hex Nut
119		#8 External Tooth Lockwasher
120	61-8PB4	8-32 Phillips BHMS

ELECTRICAL PARTS LIST

Transport Mechanism

Ref. No.	Part No.	Description
C1		Cap., Molded Tub., .1 mfd @ 400V.
C2		Cap., Molded Tub., .1 mfd @ 400V.

Ref No	Part No.	Description
M1	43A117	PWR OFF-SPEED Switch, 3 Pole.
M2	43X89	RAPID REELING Switch, Push, DPST.

Transport Mechanism (Continued)

Ref. No.	Part No.	Description
M3	43X30	DIRECTION Switch, Push.
M4	43X30	DIRECTION Switch, Push.
M5	55A64	Varicon Connector, 4 Contact, Male.
M6	55A64	Varicon Connector, 4 Contact, Male.
M7		Plug, Jones, P-308-CCT, 8 Contact, Male.
M8		Socket, Jones, S-308-AB, 8 Contact, Female.

Ref. No.	Part No.	Description
M9	54A78	Varicon Connector, 4 Contact, Female.
M10	55A64	Varicon Connector, 4 Contact, Male.
M11	55A65	Varicon Connector, 20 Contact, Male.
M12	91A2166	Head Cable & Connector. No. 2
M13	91A2159	Head Cable & Connector. No. 1

Preamplifier Chassis

Ref. No.	Part No.	Description
V1	97-12AY7	12AY7 tube.
V2	97-12AX7	12AX7 tube.
V3	97-12AX7	12AX7 tube.
V4	97-6X4	6X4 tube.
C1A	23X18	Cap., Elect., 15 mfd @ 450V.
C1B		Cap., Elect., 15 mfd @ 450V.
C1C		Cap., Elect., 10 mfd @ 450V.
C2A	23X7	Cap., Elect., 20 mfd @ 450V.
C2B		Cap., Elect., 20 mfd @ 450V.
C3	23X19	Cap., Elect., 500 mfd @ 25V.
C4	23X19	Cap., Elect., 500 mfd @ 25V.
C5A	23X15	Cap., Elect., 40 mfd @ 150V.
C5B		Cap., Elect., 40 mfd @ 150V.
C6	21X33	Cap., Mica, 1500 mmf.
C7	21X14	Cap., Ceramic, 20,000 mmf.
C8	22X10	Cap., Paper Tub., .02 mfd @ 400V.
C9	22X38	Cap., Paper Tub., 1 mfd @ 200V.
C10	21X33	Cap., Mica, 1500 mmf.
C11	21X14	Cap., Ceramic, 20,000 mmf.
C12	22X10	Cap., Paper Tub., .02 mfd @ 400V.
C13	22X38	Cap., Paper Tub., 1 mfd @ 200V.
C14	22X10	Cap., Paper Tub., .02 mfd @ 400V.
C15	21X20	Cap., Mica, 1000 mmf.
C16	22X10	Cap., Paper Tub., 02 mfd @ 400V.
C17	22X15	Cap., Molded Tub., .1 mfd @ 400V.
C18	22X50	Cap., Molded Tub., .1 mfd @ 600V.
C19	22X50	Cap., Molded Tub., .1 mfd @ 600V.
C20	22X50	Cap., Molded Tub., .1 mfd @ 600V.
C21	22X50	Cap., Molded Tub., .1 mfd @ 600V.
C22	22X50	Cap., Molded Tub., .1 mfd @ 600V.
C23	22X50	Cap., Molded Tub., .1 mfd @ 600V.
C24	22X50	Cap., Molded Tub., .1 mfd @ 600V.
C25	22A70	Cap., Oil, 4 mfd @ 330V.
C26	22A70	Cap., Oil, 4 mfd @ 330V.
C27	22A70	Cap., Oil, 4 mfd @ 330V.
R1	14X53	Balance Control 2000Ω
R2	11X117	Resistor, 3.3 Meg., 1 Watt.
R3	11X113	Resistor, 120KΩ, 1 Watt.
R4	11X117	Resistor, 3.3 Meg., 1 Watt.

Ref. No.	Part No.	Description
R5	11X4	Resistor, 470KΩ, 1/2 Watt.
R6	11X115	Resistor, 10 Meg., 1/2 Watt.
R7	11X117	Resistor, 3.3 Meg., 1 Watt.
R8	11X113	Resistor, 120KΩ, 1 Watt.
R9	11X117	Resistor, 3.3 Meg., 1 Watt.
R10	11X4	Resistor, 470KΩ, 1/2 Watt.
R11	11X115	Resistor, 10 Meg., 1/2 Watt.
R12	11X124	Resistor, 270KΩ, 1 Watt.
R13	11X114	Resistor, 390KΩ, 1/2 Watt.
R14	11X144	Resistor, 4.7 Meg., 1/2 Watt.
R15	11X115	Resistor, 10 Meg., 1/2 Watt.
R16	11X6	Resistor, 270KΩ, 1/2 Watt.
R17	11X106	Resistor, 330KΩ, 1/2 Watt.
R18	11X113	Resistor, 120KΩ, 1 Watt.
R19	12X4	Resistor, 2000Ω, 10 Watt, W.W.
R20	12X55	Resistor, 50KΩ, 10 Watt, W.W.
R21	11X90	Resistor, 10KΩ, 1 Watt.
R22	11X91	Resistor, 27KΩ, 1 Watt.
R23	12X20	Resistor, 25Ω, 10 Watt, Adj., W. W.
R24	11X122	Resistor, 390Ω, 2 Watt.
R25	11X79	Resistor, 12Ω, 1 Watt.
R26	12X51	Resistor, 100Ω, 10 Watt, W.W.
R27	12X56	Resistor, 1000Ω, 20 Watt, W.W.
T1	32B27	Power Transformer
M1	42A6	Rectifier, Selenium, 600 ma.
M2	42A10	Rectifier, Selenium, 250 ma.
M3	42X7	Rectifier, Selenium, 40 ma.
M4	53X11	Fuse-4 Amp., Slo-Blo.
M5	53X11	Fuse-4 Amp., Slo-Blo.
M6	41X43	Direction Ind. Lamp, 6S6, 6 Watt, 125V.
M7	41X43	Direction Ind. Lamp, 6S6, 6 Watt, 125V.
M8	43X133	Reversing Relay.
M9	55A63	Varicon Connector, 4 Contact, Male.
M10	55A63	Varicon Connector, 4 Contact, Male.
M11	56X24	Barrier Strip, 2 Contact.
M12	54A78	Varicon Connector, 4 Contact, Female.
M13	54A78	Varicon Connector, 4 Contact, Female.
M14	55X21	AC Connector
M15	54A80	Varicon Connector, 20 Contact, Female.

Record Bias Oscillator Chassis

Ref. No.	Part No.	Description
V1	97-12AU7	12AU7
C1A	23X15	Cap., Elect., 40 mfd @ 150V.
C1B		Cap., Elect., 40 mfd @ 150V.
C2	21X36	Cap., Mica, 5000 mmf, 5%.
C3	22X59	Cap., Molded Tub., .1 mfd @ 400V.
C4	26A4	Cap., Bath tub, .1 mfd @ 600V.
C5	21X6	Cap., Mica, 2000 mmf.
C6	21X6	Cap., Mica, 2000 mmf.
C7	22X50	Cap., Molded Tub., .1 mfd @ 600V.
C8	21X1	Cap., Mica, 2500 mmf.
C9	22X50	Cap., Molded Tub., .1 mfd @ 600V.
C10	22X50	Cap., Molded Tub., .1 mfd @ 600V.
C11	22X50	Cap., Molded Tub., .1 mfd @ 600V.

Ref. No.	Part No.	Description
C12	22X50	Cap., Molded Tub., .1 mfd @ 600V.
C13	22X50	Cap., Molded Tub., .1 mfd @ 600V.
C14	22X50	Cap., Molded Tub., .1 mfd @ 600V.
C15	22X50	Cap., Molded Tub., .1 mfd @ 600V.
C16	22A70	Cap., Oil, 4 mfd @ 330V.
C17	22A70	Cap., Oil, 4 mfd @ 330V.
C18	22A70	Cap., Oil, 4 mfd @ 330V.
R1	12X5	Resistor, 4Ω, 10 Watt, W.W.
R2	11X10	Resistor, 22KΩ, 1/2 Watt.
R3	11X10	Resistor, 22KΩ, 1/2 Watt.
R4	11X14	Resistor, 100Ω, 1/2 Watt.
R5	11X179	Resistor, 12Ω, 1 Watt.
R6	12X51	Resistor, 100Ω, 10 Watt, W. W.

Record Bias Oscillator Chassis (Continued)

Ref. No.	Part No.	Description
R7	12X56	Resistor, 1000Ω, 20 Watt, W.W.
T1	31A6	Oscillator Transformer
M1	42A10	Rectifier, Selenium, 250 ma.
M2	42X7	Rectifier, Selenium, 40 ma.
M3	53X10	Fuse, 3 Amp. Slo-Blo.
M4	53X10	Fuse, 3 Amp. Slo-Blo.
M5	41X43	Direction Ind. Lamp. S-6dc, 6 Watt 125V.
M6	41X43	Direction Ind. Lamp. S-6dc, 6 Watt 125V.

Ref. No.	Part No.	Description
M7	43X133	Reversing Relay.
M8	55A63	Varicon Connector, 4 Contact, Male.
M9	55A63	Varicon Connector, 4 Contact, Male.
M10	54X2	Cannon Connector, XL-3-13N, Female.
M11	55X2	Plug, Jones, P-406-CCT, 6 Contact, Male.
M12	54A78	Varicon Connector, 4 Contact, Female.
M13	54A78	Varicon Connector, 4 Contact, Female.
M14	54A80	Varicon Connector, 20 Contact, Female.

PHOTOFACT* Folder

EIA MEMBER ELECTRONIC INDUSTRIES ASSOCIATION

PHILCO MODELS F-1800, F-1801, F-1804

PHILCO MODELS
F-1800, F-1801, F-1804

MODEL F-1804

PHILCO MODELS
F-1800, F-1801, F-1804

TRADE NAME	Philco Models F-1800, F-1801, F-1804
MANUFACTURER	Philco Corp., Tioga & "C" Sts., Philadelphia, Pa.
TYPE SET	AC Operated Phono Amplifier With 4 Speed Automatic Record Changer
TUBES (Five)	Types 12AX7 AF Amplifier, 6C4 Phase Inverter, (2) 6CZ5 Output, 5Y3GT Rectifier
POWER SUPPLY	105-120 Volts AC-60 Cycles RATING .72 Amp. @ 117 Volts AC (70 Watts) Less Motor

FOR SERVICE INFORMATION ON RECORD CHANGER - SEE PHILCO M-39 - PHOTOFACT SET 362 FOLDER 6 OR RECORD CHANGER MANUAL RC-10

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

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H736

PARTS LIST AND DESCRIPTIONS

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE	NOTES
V1	AF Amplifier	12AX7	
V2	Phase-Inverter	6C4	
V3	Output	6CZ5	
V4	Output	6CZ5	
V5	Rectifier	5Y3GT	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT.	PHILCO PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1A	40	450	20-2584-36	AFH4-85-25	D0655	FP431.3	TMQ-99	T-165	TVL-4746
B	30	450						MT-0550	
C	10	450							
D	50	50							
C2	10	25	30-2417-8	PRS25V10	BBR10-25	TT50X10	TD-10-25	MT-0210	TVA-1204

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP.	VOLT	PHILCO PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	SPRAGUE PART No.	
C3	.0022	400	30-4651-23						10%
C4	.0068	400	30-4650-57				GEM-16268		10%
C5	.0047	400	30-4650-56				GEM-16247		10%
C6	.0047	400	30-4650-56	P488N-0047	D6-472	CUB6D47	GEM-6247	6TM-D47	
C7	.022	600	30-4650-60	P688N-022		CUB6S22	GEM-6122	6TM-S22	
C8	.0015	400	30-4650-53						10%
C9	.015	400	30-4650-42						10%
C10	68		60-00685217	1469-000068	DD-680	22R5Q68		MS-468	10%
C11	.001	400	30-4650-52	P488N-001	D6-102	CUB6D1	GEM-421	6TM-D1	
C12	.047	600	30-4650-62	P688N-047	DF-503	CUB6S47	GEM-6147	6TM-S47	
C13	.0022	1000	30-4650-88	P1088N-0022	D6-222	CUB10D22	GEM-10222	10TM-D22	
C14	.0022	1000	30-4650-88	P1088N-0022	D6-222	CUB10D22	GEM-10222	10TM-D22	
C15	.047	600	30-4650-62	P688N-047	DD-503	CUB6S47	GEM-6147	6TM-S47	
C16	.01	400	30-4650-41	P488N-01	D6-103	CUB6S1	GEM-411	4TM-S1	
C17	.01	600	30-4650-58	P688N-01	D6-103	CUB6S1	GEM-611	6TM-S1	
C18	.047	600	30-4650-62	P688N-047	DF-503	CUB6S47	GEM-6147	6TM-S47	

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	PHILCO PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1	2meg	½	33-5535-47					Volume, Tap ⓐ 200K & 1meg
R1	2meg	½	33-5535-44①					Volume, Tap ⓐ 200K & 1meg
R2A	1meg	½	33-5587-29	B-70	A47-1meg-Z	Q13-137	U53	Bass
B	Shaft			Not Req.	FS-3	Not Req.	Not Req.	
R2A	1meg	½	33-5587-18①	B-70	A47-1meg-Z	Q13-137	U53	Bass
B	Shaft			Not Req.	FS-3	Not Req.	Not Req.	
R3A	1meg	½	33-5587-29	B-70	A47-1meg-Z	Q13-137	U53	Treble
B	Shaft			Not Req.	FS-3	Not Req.	Not Req.	
R3A	1meg	½	33-5587-18①	B-70	A47-1meg-Z	Q13-137	U53	Treble
B	Shaft			Not Req.	FS-3	Not Req.	Not Req.	

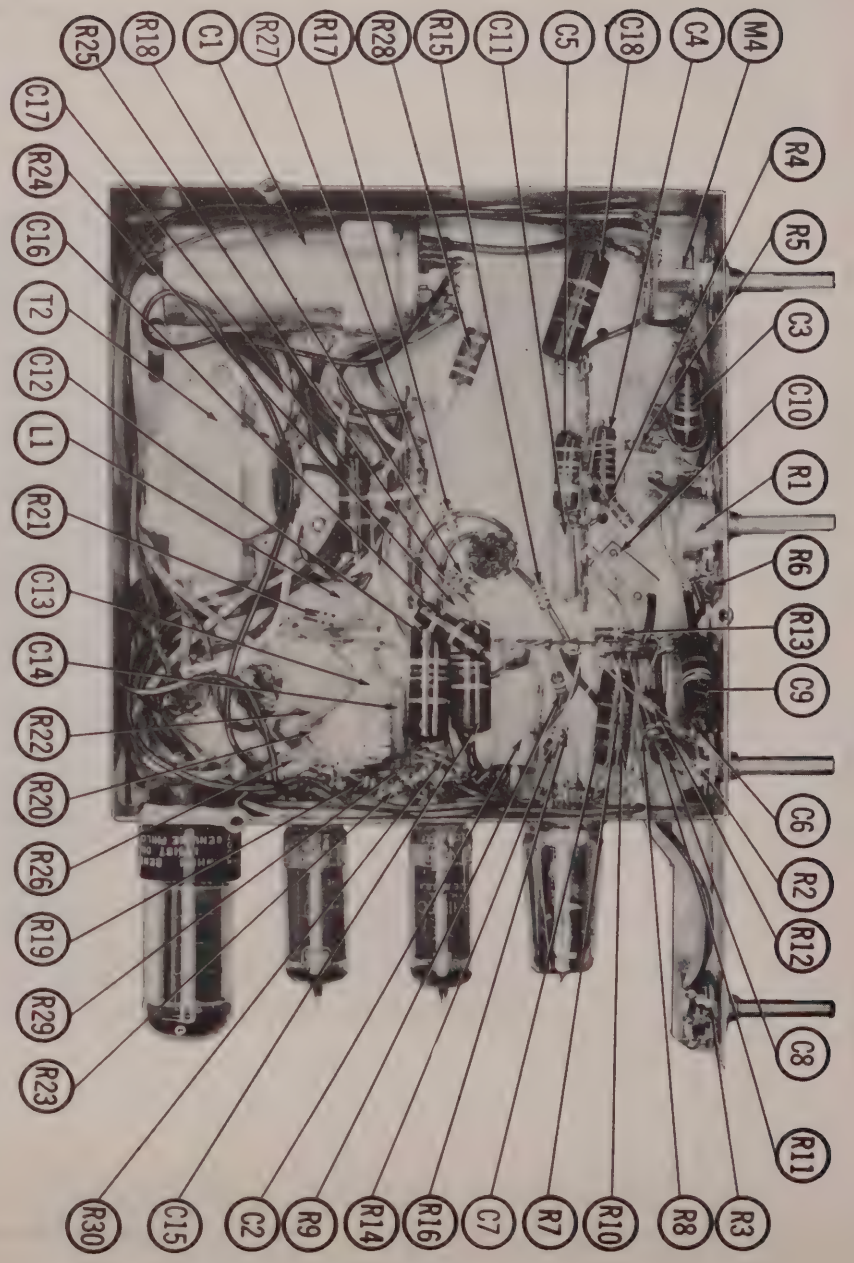
① Alternate Part No.

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING		PHILCO PART No.	NOTES
	OHMS	WATT		
R4	82K		66-3828340	
R5	22K		66-3228340	
R6	470K		66-4478340	
R7	1meg		66-5108340	
R8	15meg		66-6158340	
R9	270K		66-4278340	Note 1
R10	2200Ω		66-2278340	
R11	220K		66-4228340	
R12	22K		66-3228340	
R13	100K		66-4108340	
R14	100K		66-4108340	
R15	470K		66-4478340	
R16	2700Ω		66-2278340	
R17	47K		66-3478340	

CHASSIS—BOTTOM VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS (cont)

ITEM No.	RATING OHMS	RATING WATT	PHILCO PART No.	NOTES
R18	47K		66-3478340	
R19	470K		66-4478340	
R20	4700Ω		66-2478340	
R21	3300Ω		66-2338340	
R22	330Ω	7	33-1335-90	
R23	470K		66-4478340	
R24	330Ω		66-1338340	
R25	47Ω		66-0478340	
R26	4.7meg		66-5478340	
R27	10K		66-3108340	
R28	4700Ω	2	66-2475340	
R29	56Ω		66-0568340	
R30	56Ω		66-0568340	

Note 1. Some versions may use 100K in this application (Part #66-5108340).

COILS

ITEM No.	USE	REPLACEMENT DATA PHILCO PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No.	NOTES
L1	Crossover Choke	32-4628					

TRANSFORMER (POWER)

ITEM No.	RATING PRI.	SEC. 1	SEC. 2	REPLACEMENT DATA PHILCO PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117V @.72A	680VCT @.100A	5V @1.72A	32-8828-1						
	SEC. 3	SEC. 4	SEC. 5							
	6.3V @1.34A									

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE PRI.	SEC.	REPLACEMENT DATA PHILCO PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T2	6800Ω CT	3-4Ω	32-8640	Z1011	A-2901①	AU-609	A-3870	24S60①	S-55X	① Drill New Mounting Hole

SPEAKER

ITEM No.	TYPE SIZE	FIELD	V. C. IMP.	REPLACEMENT DATA PHILCO PART No.	QUAM PART No.	NOTES
SP1	10"	PM	3-4Ω	36-1653-4	10A6A	
SP2	5½"x8"	Electrostatic		36-1656		

PHONO CARTRIDGE

ITEM No.	REPLACEMENT DATA PHILCO PART No.	ASTATIC PART No. CARTRIDGE	ASTATIC PART No. NEEDLE	JENSEN PART No. CARTRIDGE	JENSEN PART No. NEEDLE	REMARKS
M1	325-8018①	55-T or 81-TB	GD-J			① Includes needle

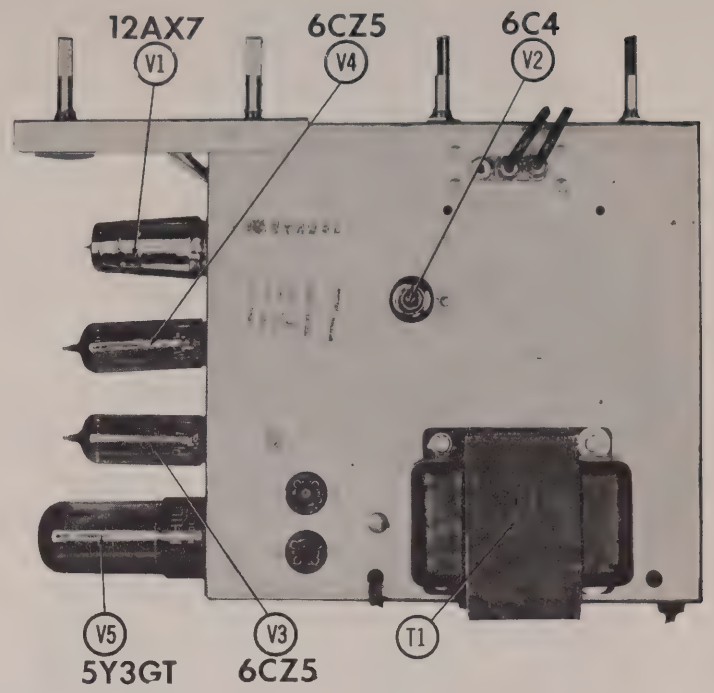
ASTATIC NEEDLE LISTING SHOWN ABOVE IS SPECIFIED FOR THE RESPECTIVE REPLACEMENT CARTRIDGE LISTED. FOR ORIGINAL CARTRIDGE NEEDLE REPLACEMENTS SEE BELOW.

PHONO NEEDLE

(FOR REPLACEMENT IN ORIGINAL EQUIPMENT CARTRIDGE)

ITEM No.	REPLACEMENT DATA PHILCO PART No.	JENSEN PART No.	WALCO PART No.	REMARKS
M2	325-8019	† S-66 or †♦ S-66SD or ♦ S-66D	† W-75TPS or †♦ W-75DS or ♦ W-75TPD	† Jewel ♦ Diamond

CHASSIS—TOP VIEW



MISCELLANEOUS

ITEM No.	PART NAME	PHILCO PART No.	NOTES
M3	Lamp	34-2068	#47
M4	Switch	42-2080	Input Selector, Rotary, Wafer Type

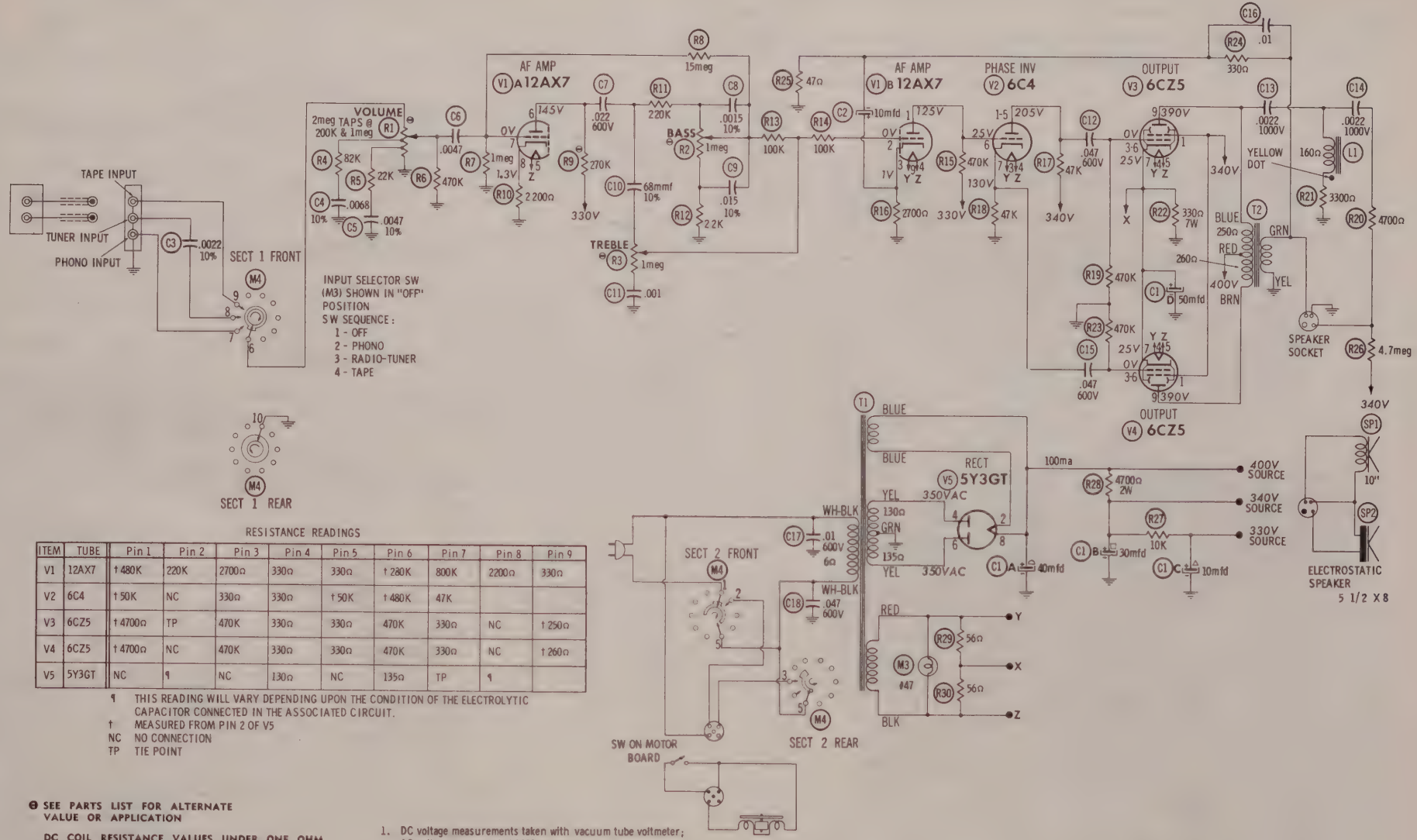
CABINETS & CABINET PARTS

(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

NAME	PART NO.	DESCRIPTION
Knob	54-6147-25	4 Used
Cabinet	11313-2	Walnut, Model F-1804
Cabinet	11313	Blonde, Model F-1804
Cabinet	11309-1	Cherry, Model F-1801
Cabinet	11309	Mahogany, Model F-1801
Cabinet	11292-4	Fruitwood, Model F-1800
Cabinet	11292-2	Blonde, Model F-1800
Cabinet	11292	Mahogany, Model F-1800

WIRING DATA

General-use Unshielded Hook-up Wire	Use BELDEN No.	8530 (Solid) Available in Ten Colors 8524 (Stranded) Available in Ten Colors
Power Cord	Use BELDEN No.	1765-B (6 Ft. Length) 1725-K (7½ Ft. Length)
Low-Loss Shielded Lead (Interconnecting)	Use BELDEN No.	8401
Phono Pick-up Arm Cable	Use BELDEN No.	8430 (Two Conductor - Twisted)



RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	12AX7	†480K	220K	2700Ω	330Ω	330Ω	†280K	800K	2200Ω	330Ω
V2	6C4	†50K	NC	330Ω	330Ω	†50K	†480K	47K		
V3	6CZ5	†4700Ω	TP	470K	330Ω	330Ω	470K	330Ω	NC	†250Ω
V4	6CZ5	†4700Ω	NC	470K	330Ω	330Ω	470K	330Ω	NC	†260Ω
V5	5Y3GT	NC	¶	NC	130Ω	NC	135Ω	TP	¶	

¶ THIS READING WILL VARY DEPENDING UPON THE CONDITION OF THE ELECTROLYTIC CAPACITOR CONNECTED IN THE ASSOCIATED CIRCUIT.
† MEASURED FROM PIN 2 OF V5
NC NO CONNECTION
TP TIE POINT

Θ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance of component values makes possible a variation of ±15% in voltage and resistance readings.
6. All controls at minimum, proper output load connected.

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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PHOTOFACT* Folder

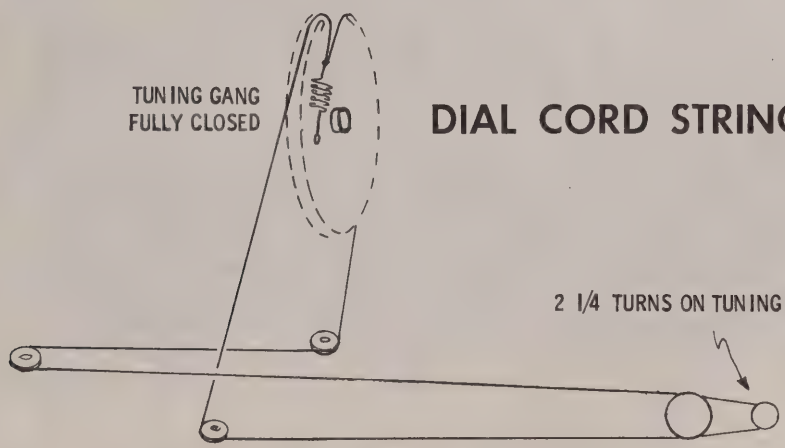
EIA

PILOT
MODEL FA-550

PILOT
MODEL FA-550

PILOT
MODEL FA-550

TRADE NAME	Pilot Model FA-550		
MANUFACTURER	Pilot Radio Corp., 37-06 36th Street, Long Island City 1, N. Y.		
TYPE SET	AC Operated FM-AM Tuner With Preamplifier		
TUBES	Twelve		
POWER SUPPLY	105 - 120 Volts AC-60 Cycles	RATING	.64 Amp. @ 117 Volts AC (68 Watts) FM
TUNING RANGE - BROADCAST	535 - 1650KC	FREQ. MOD.	88 - 108MC



DIAL CORD STRINGING

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

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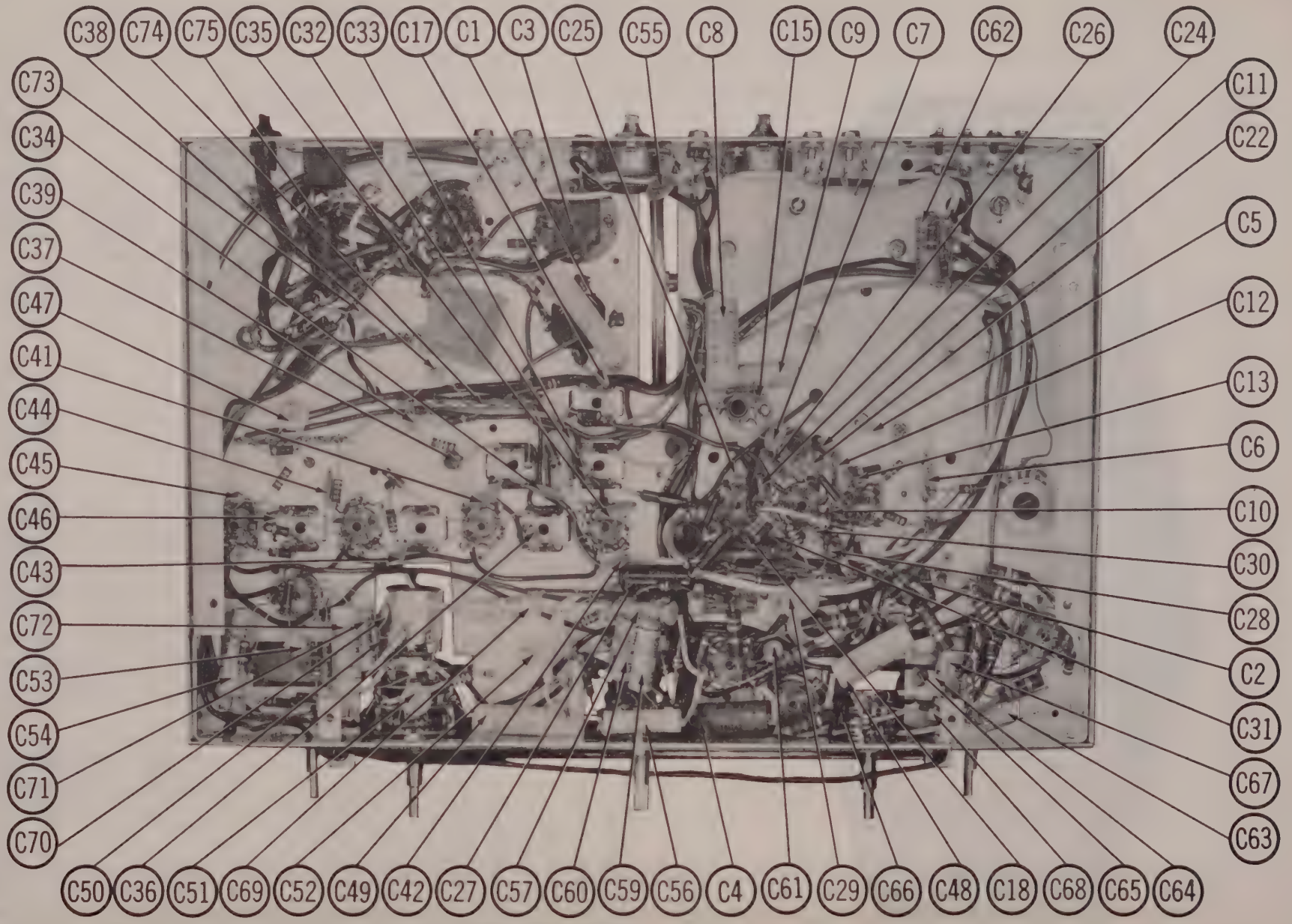
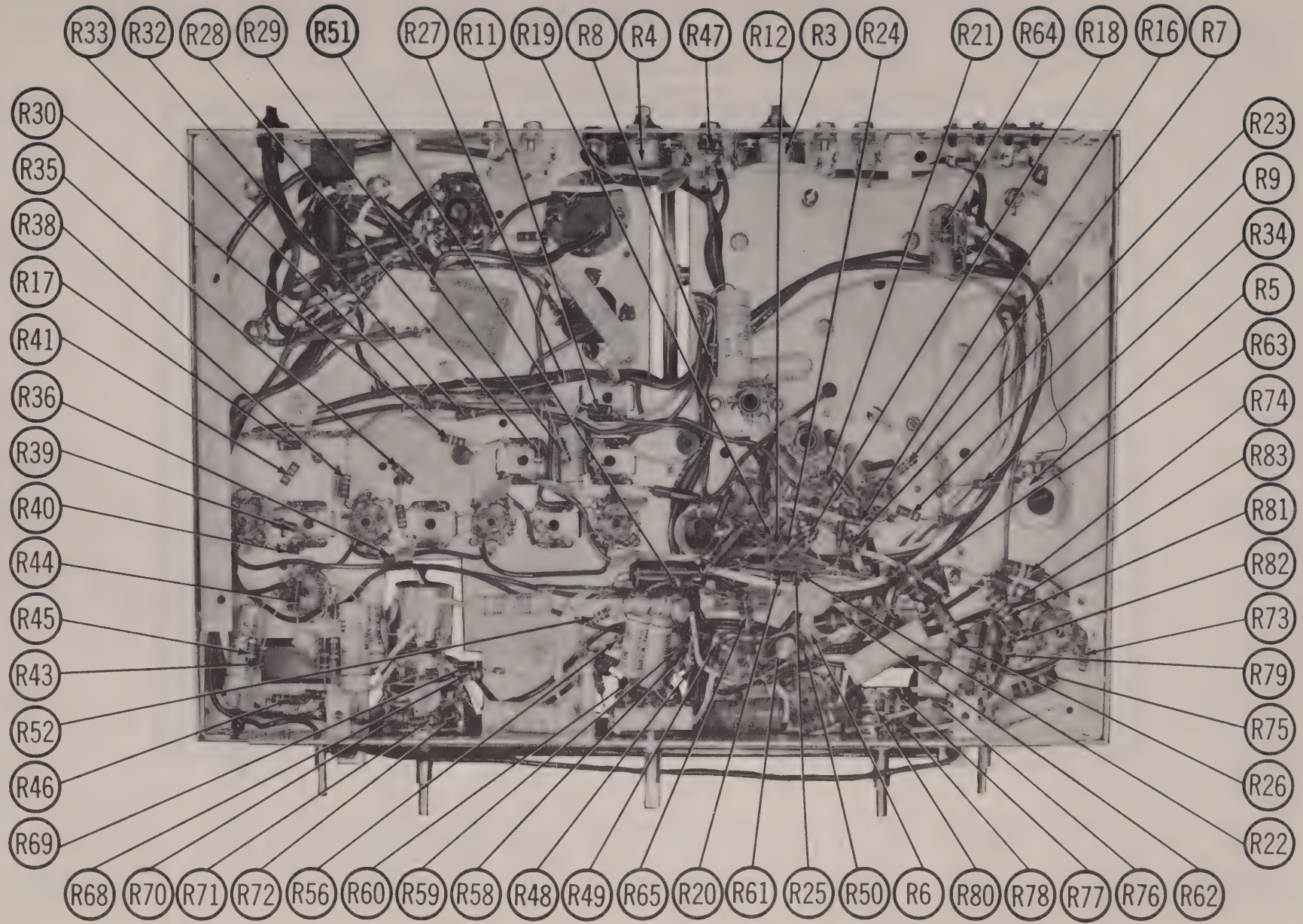
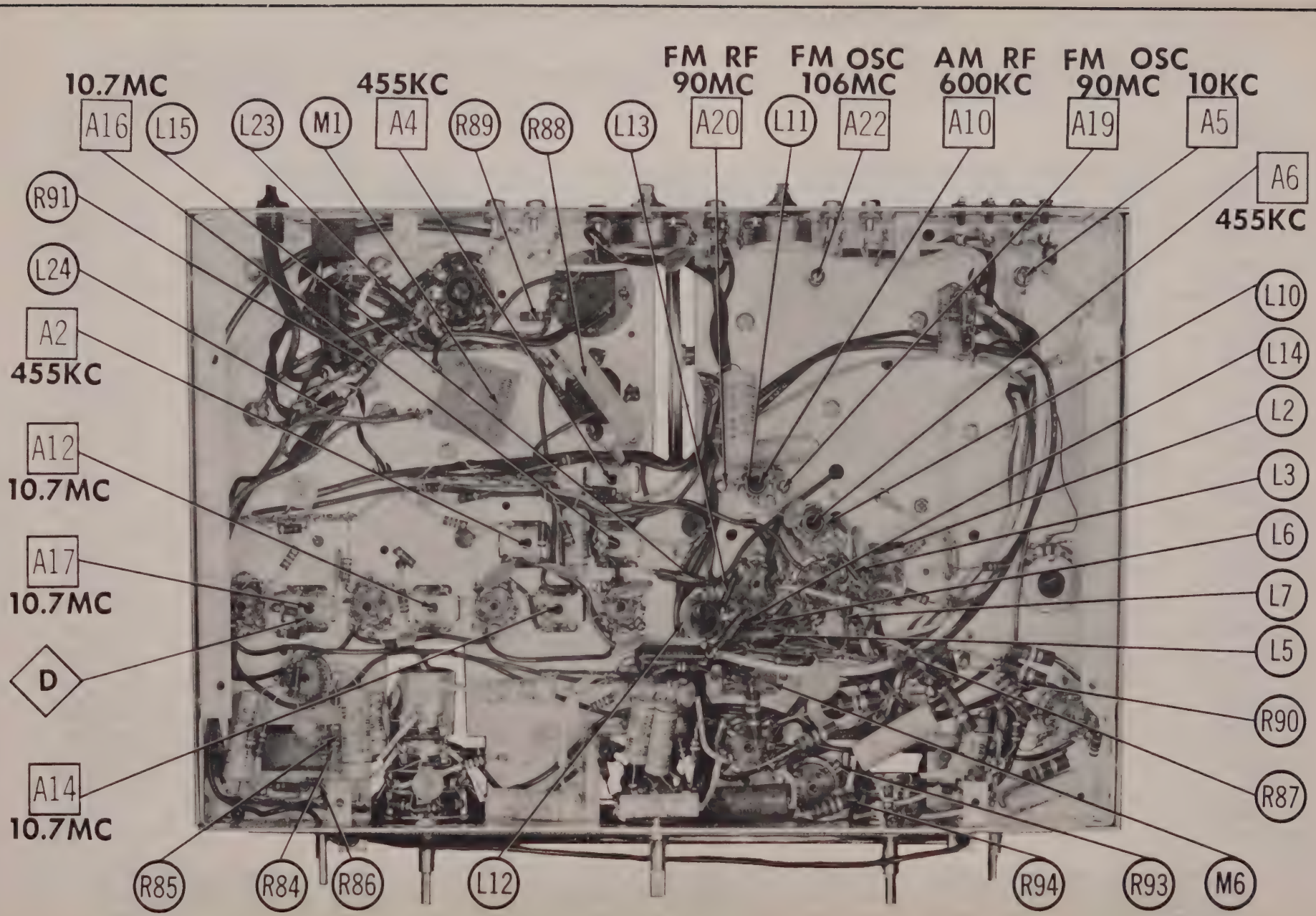


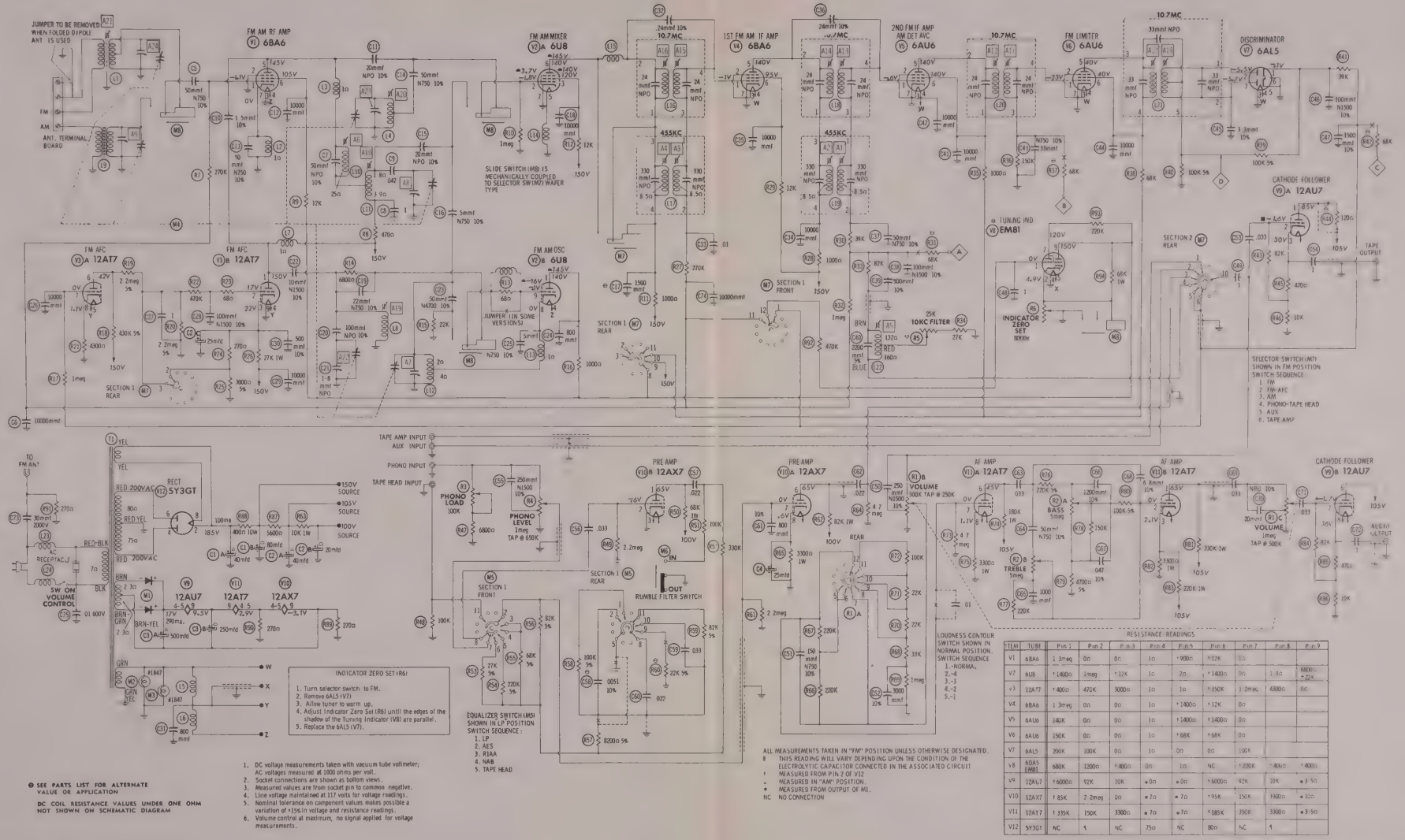
CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION



CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION



CHASSIS BOTTOM VIEW - ALIGN., INDUCTOR, RESISTOR, & MISC. IDENT.



INDICATOR ZERO SET (R6)

1. Turn selector switch to FM.
2. Remove 6AL5 (V7).
3. Allow tuner to warm up.
4. Adjust Indicator Zero Set (R6) until the edges of the shadow of the Tuning Indicator (V8) are parallel.
5. Replace the 6AL5 (V7).

⊖ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

ALL MEASUREMENTS TAKEN IN "FM" POSITION UNLESS OTHERWISE DESIGNATED.
‖ THIS READING WILL VARY DEPENDING UPON THE CONDITION OF THE ELECTROLYTIC CAPACITOR CONNECTED IN THE ASSOCIATED CIRCUIT
! MEASURED FROM PIN 2 OF V12
- MEASURED IN "AM" POSITION.
• MEASURED FROM OUTPUT OF M1.
NC NO CONNECTION

RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	6BA6	1.3meg	0Ω	0Ω	1Ω	*900Ω	*12K	1Ω		
V2	6U8	*1400Ω	1meg	*12K	1Ω	2Ω	*1400Ω	0Ω	1.4Ω	680Ω±22K
V3	12AT7	*400Ω	470K	3000Ω	1Ω	1Ω	*350K	1.2meg	430Ω	0Ω
V4	6BA6	1.3meg	0Ω	0Ω	1Ω	*1400Ω	*12K	0Ω		
V5	6AU6	140K	0Ω	0Ω	1Ω	*1400Ω	*1400Ω	0Ω		
V6	6AU6	150K	0Ω	0Ω	1Ω	*68K	*68K	0Ω		
V7	6AL5	200K	100K	0Ω	1Ω	0Ω	0Ω	100K		
V8	6DA5 EM81	680K	1200Ω	*400Ω	0Ω	1Ω	NC	*220K	*40Ω	*400Ω
V9	12AU7	*6000Ω	92K	10K	•0Ω	•0Ω	*6000Ω	92K	10K	•3.5Ω
V10	12AX7	‖ 85K	2.2meg	0Ω	•7Ω	•7Ω	*95K	150K	3300Ω	•10Ω
V11	12AT7	‖ 335K	150K	3300Ω	•7Ω	•7Ω	*185K	350K	3300Ω	•3.5Ω
V12	5Y3GT	NC	1	NC	75Ω	NC	80Ω	NC	1	

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ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading.
Use an insulated alignment screwdriver for adjusting.
To set pointer, turn tuning gang fully closed and adjust pointer to coincide with last reference mark on logging scale.

AM ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
1.	.01mfd	High side to pin 2 (grid) of 6U8 (V2). Low side to chassis.	455KC (400∿ Mod.)	AM	Tuning gang fully open	DC probe to point Ⓐ. Common to chassis.	A1, A2, A3, A4	Adjust for maximum deflection.
2.	"	"	455KC (10KC Mod.)	"	"	Use AC probe Connect VTVM across tape out Jack.	A5, R5	Adjust for MINIMUM deflection.
3.	"	High side to AM antenna terminal. Low side to chassis.	455KC (400∿ Mod.)	"	"	DC probe to point Ⓐ. Common to chassis.	A6	"
4.	"	"	1500KC	"	1500KC	"	A7, A8, A9	Adjust for maximum deflection.
5.	"	"	600KC	"	600KC	"	A10	Adjust for maximum deflection while rocking tuning gang. Repeat steps 4 & 5.

FM IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
6.	200mmf	High side to pin 2 (grid) of 6U8 (V2). Low side to chassis.	10.7MC (Unmod.)	FM	Point of non-interference	DC probe to point Ⓑ. Common to chassis.	A11, A12, A13, A14, A15, A16	Adjust for maximum deflection.
7.	"	"	"	"	"	DC probe to point Ⓓ. Common to chassis.	A17	"
8.	"	"	"	"	"	DC probe to point Ⓒ. Common to chassis.	A18	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.

FM IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60∿ modulation and 450KC sweep. Use 120∿ sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT SCOPE	ADJUST	REMARKS
6.	200mmf	High side to pin 2 (grid) of 6U8 (V2). Low side to chassis.	10.7MC (450KC Swp)	FM	Point of non-interference	Vert. Amp. to point Ⓑ. Low side to chassis.	A11, A12, A13, A14, A15, A16	Adjust for curve of maximum amplitude and symmetry similar to Fig. 1.
7.	"	"	"	"	"	Vert. Amp. to point Ⓓ. Low side to chassis.	A17	Adjust for curve of maximum amplitude and symmetry similar to Fig. 1.
8.	"	"	"	"	"	Vert. Amp. to point Ⓒ. Low side to chassis.	A18	Adjust so that 10.7MC occurs at center of crossover lines similar to Fig. 2. SLIGHTLY retouch A17 for maximum amplitude and straightness of crossover lines.

FM RF ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
9.	270Ω Carbon Resistor	Across FM antenna terminals	90MC (Unmod.)	FM	90MC	DC probe to point Ⓑ. Common to chassis.	A19, A20 A21	Adjust for maximum deflection.
10.	"	"	106MC	"	106MC	"	A22, A23, A24	"

FIG. 1

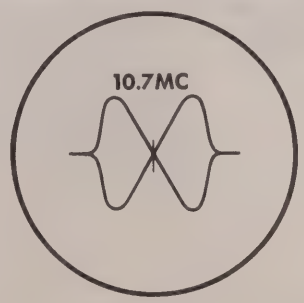
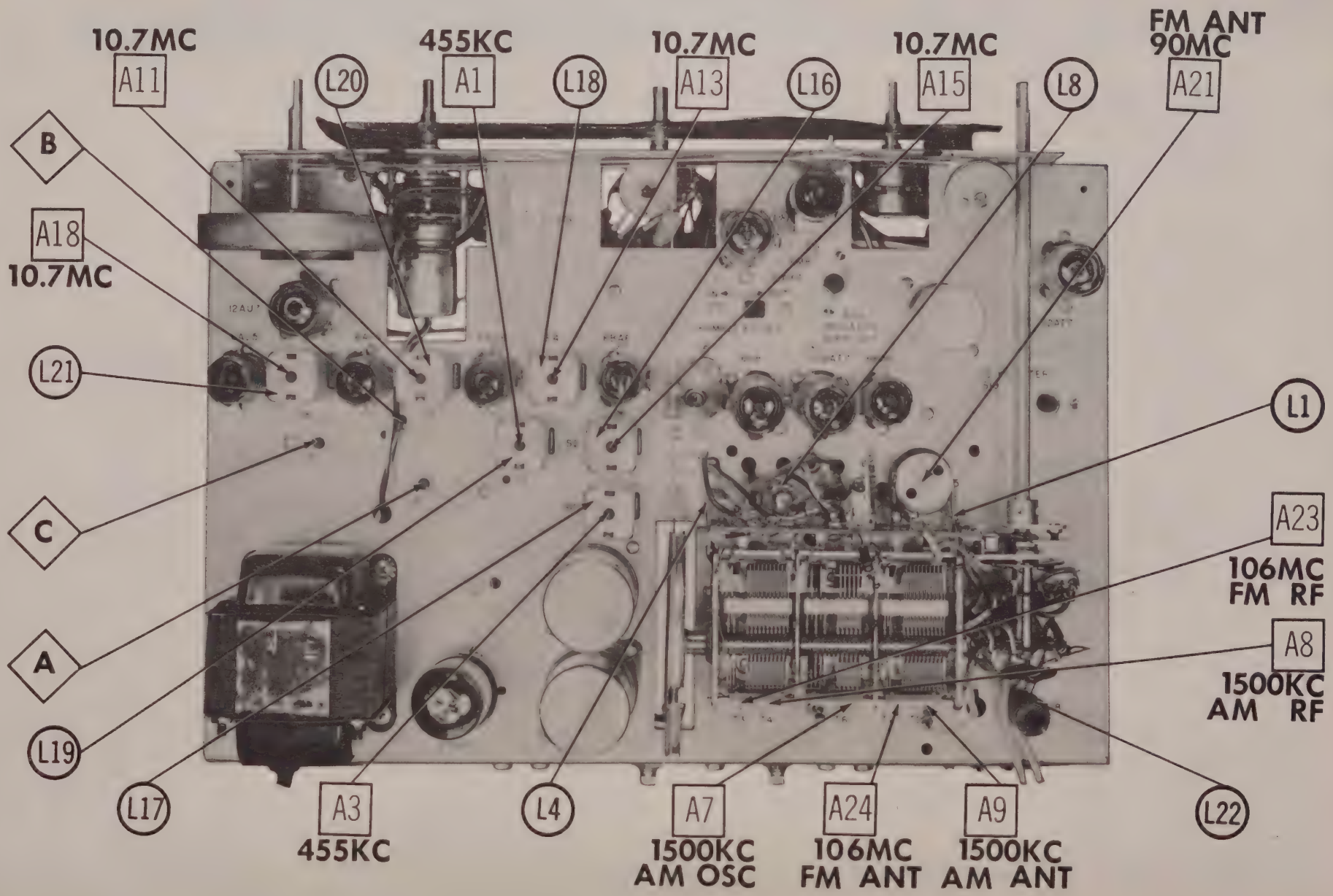
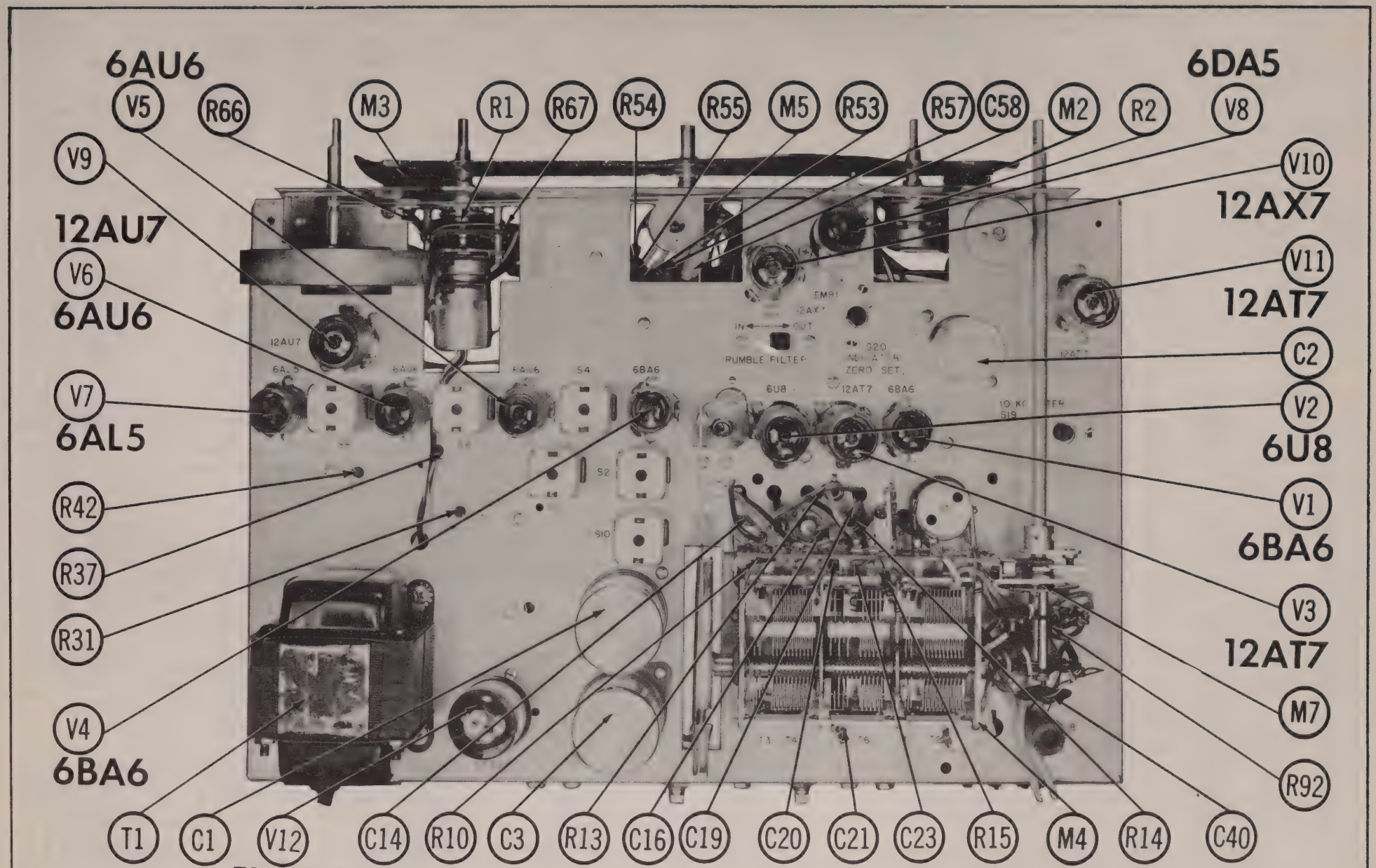


FIG. 2



CHASSIS-TOP VIEW



CHASSIS TOP VIEW

MODEL FA-550

PILOT

PARTS LIST AND DESCRIPTIONS

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE	NOTES
V1	FM-AM RF Amplifier	6BA6	
V2	FM AM Mixer-FM AM Osc.	6U8	
V3	FM AFC	12AT7	
V4	1st FM-AM IF Amplifier	6BA6	
V5	2nd FM IF Amp. - AM Det. - AVC	6AU6	
V6	FM Limiter	6AU6	

ITEM No.	USE	TYPE	NOTES
V7	Discriminator	6AL5	
V8	Tuning Indicator	EM81/6DA5	Note 1
V9	Cathode Follower	12AU7	
V10	Preamplifier	12AX7	
V11	AF Amplifier	12AT7	
V12	Rectifier	5Y3GT	

Note 1. Domestic type listed may not be directly interchangeable in some instances.

ELECTROLYTIC CAPACITORS

ITEM No.	RATING CAP.	RATING VOLT.	REPLACEMENT DATA PILOT PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1A	▲40	250	24-115	AFH2-40-80	XB0243	FP227.5	TMD-104	D-140	TVL-2582
B	▲80	250							
C2A	▲40	250	24-136	AFH3-98	XC0732	FP321	TMT-20	T-090	TVL-3540
B	■20	250							
C	25	25							
C3A	▲500	35	24-135		BR5005				R2708 *
B	▲250	35			BR2505				
C4	25	25	24-50	PRS25V25	BBR25-25	TC26	TD-25-25	MT-0225	TVA-1205

* Not normally in distributors stock. Available thru distributor on order to manufacturer.

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING CAP.	RATING VOLT	REPLACEMENT DATA PILOT PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C5	50					C10Q5U			N750 10%
C6	10000			BPD-01	DD-103	BYA10S1	DC511	5HK-S1	
C7	50			NPO-DI 50	DTZ-50	C10Q5C	ZT545	5TCC-Q5	NPO 10%
C8	.1	400		P488N-1	DD-104	CUB4P1	GEM-401	4TM-P1	
C9	.047	400		P488N-047		CUB4S47	GEM-4147	4TM-S47	
C10	1.5			NPO-SI 1.5	TCZ-1R5	CTA6V15C	ZT-5515	5TCCB-V15	10%
C11	20			NPO-DI 20	DTZ-20	C10Q2C	ZT-542	5TCC-Q2	NPO 10%
C12	10000			BPD-01	DD-103	BYA10S1	DC511	5HK-S1	
C13	50					C10Q5U			N750 10%
C14	50					C10Q5U			N750 10%
C15	20			NPO-DI 20	DTZ-20	C10Q2C	ZT-542	5TCC-Q2	NPO 10%
C16	5				DTN-5	C10V5U	NT-555	5TCUB-V5	N750 10%
C17	1500			BPD-0015	DD-152	BYA10D15	DC5215	5HK-D15	①
C18	10000			BPD-01	DD-103	BYA10S1	DC511	5HK-S1	
C19	22			N750-DI 22	DTN-22	C10Q22U		5TCU-Q22	N750 10%
C20	100			NPO-SI 100	DTZ-100	C10T1C	ZT-531	5TCC-T1	NPO 10%
C21	1-8								NPO
C22	10								N1500 10%
C23	50								N4700 10%
C24	800				DD-801	L10T8		5GA-T8	
C25	5				DTN-5	C10V5U	NT-555	5TCUB-V5	N750 10%
C26	10000			BPD-01	DD-103	BYA10S1	DC511	5HK-S1	
C27	.1	200		P288N-1	DF-104	CUB2P1	GEM-401	2TM-P1	
C28	100								N1500 10%
C29	10000			BPD-01	DD-103	BYA10S1	DC511	5HK-S1	
C30	500				MD-501				10%
C31	800				DD-801	L10T8		5GA-T8	
C32	.24								10%
C33	.01	400		P488N-01	D6-103	CUB2S1	GEM-411	4TM-S1	
C34	10000			BPD-01	DD-103	BYA10S1	DC511	5HK-S1	
C35	10000			BPD-01	DD-103	BYA10S1	DC511	5HK-S1	
C36	.24								10%
C37	50					C10Q5U			N750 10%

CAPACITORS (cont)

ITEM No.	RATING CAP.	RATING VOLT	REPLACEMENT DATA PILOT PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C38	100								N1500 10%
C39	500				MD-501				10%
C40	2200			1464-0022		1R5D22		MS-222	5%
C41	10000			BPD-01	DD-103	BYA10S1	DC511	5HK-S1	
C42	10000			BPD-01	DD-103	BYA10S1	DC511	5HK-S1	
C43	33			N750-DI 33	DTN-33	C10Q33U		5TCU-Q33	N750 10%
C44	10000			BPD-01	DD-103	BYA10S1	DC511	5HK-S1	
C45	3.3			NPO-SI 3.3	TCZ-3R3	CTA6V33C	ZT-5533	5TCCB-V33	10%
C46	100								N1500 10%
C47	1500								10%
C48	.1	200		P288N-1	DF-104	CUB2P1	GEM-201	2TM-P1	
C49	.1	200		P288N-1	DF-104	CUB2P1	GEM-201	2TM-P1	
C50	250								N1500 10%
C51	150			N750-DI 150	DTN-150	C10T15U		5TCU-T15	N750 10%
C52	3000								10%
C53	.033	400		P488N-033		CUB6S33	GEM-4133	6TM-S33	
C54	.1	200		P288N-1	DF-104	CUB2P1	GEM-201	2TM-P1	
C55	250								N1500 10%
C56	.033	400		P488N-033		CUB6S33	GEM-4133	6TM-S33	
C57	.022	400		P488N-022		CUB4S22	GEM-4122	4TM-S22	
C58	.0051	400							② 10%
C59	.033	400		P488N-033		CUB6S33	GEM-4133	6TM-S33	
C60	.022	400		P488N-022		CUB4S22	GEM-4122	4TM-S22	
C61	800								10%
C62	.022	400		P488N-022		CUB4S22	GEM-4122	4TM-S22	
C63	.033	400		P488N-033		CUB6S33	GEM-4133	6TM-S33	
C64	50					C10Q5U			N750 10%
C65	1000			BPD-001	DD-102	BYA6D1	DC521	5HK-D1	
C66	1200								10%
C67	.047	400							10%
C68	6.8			NPO-SI 6.8	TCZ-6R8	CTA6V68C	ZT-5568	5TCCB-V68	
C69	.033	400		P488N-033		CUB6S33	GEM-4133	6TM-S33	10%
C70	20			NPO-DI 20	DTZ-20	C10Q2C	ZT-542		NPO 10%
C71	.033	400		P488N-033		CUB6S33	GEM-4133	6TM-S33	
C72	.1	200		P288N-1	DF-104	CUB2P1	GEM-201	2TM-P1	
C73	30	2000			DD30-300			20GAB-Q3	
C74	10000			BPD-01	DD-103	BYA10S1	DC511	5HK-S1	
C75	.01	600		P688N-01	D6-103	CUB6S1	GEM-611	6TM-S1	

① Some versions may use .01mfd in this application.
② Some versions may use 5000mmf in this application.

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA PILOT PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	Switch		100-120					Loudness
B	500K	½						Volume, Tap ② 250K
C	1meg	½						Volume, Tap ② 500K
D	Switch							Power On-Off
R2A	5meg	½	37-34				■ UE3854	Bass
B	5meg	½						Treble
R3A	100K	½	39-32	AB-40	A47-100K-S	Q11-128	U41 ††	Phono Load
B	Shaft			AK-24 †	RS-2 ††	PQ ††	Not Req.	
R4A	1meg	½	39-41	ABT-74	A47F5-1meg	Q19-137X	UT443	Phono Level, Tap ② 650K
B	Shaft			AK-1	FKS-1/4	Not Req.	Not Req.	
R5A	25K	½	39-44	AB-26	B47-25K-S	B11-120	TA253L	10KC Filter Note 1
B	Shaft			AK-1	Not Req.	SK2	Not Req.	
R6A	5000Ω	½	39-42	AB-10	B47-5000-S	Q11-114	TA53L	Indicator Zero Set
B	Shaft			AK-1	Not Req.	RQ	Not Req.	

■ "STA-LOC" Equivalent: FB56A, OS812, RU56A, IS1312.
Note 1 Part #39-46 (10K) may be used in some versions.
† Saw or file Slot in end of shaft to match original shaft end.
†† Saw off Shaft to correct length, then saw or file Slot to match original shaft end.

PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING OHMS	RATING WATT	PILOT PART No.	NOTES
R7	270K			
R8	470Ω			
R9	12K			
R10	1meg			
R11	1000Ω			
R12	12K			
R13	68Ω			
R14	6800Ω			
R15	22K			
R16	1000Ω			
R17	1meg			
R18	430K 5%			
R19	2.2meg5%			
R20	2.2meg5%			
R21	4300Ω			
R22	470K			
R23	68Ω			
R24	270Ω			
R25	3000Ω 5%			
R26	27K	1		
R27	270K			
R28	1000Ω			
R29	12K			
R30	39K			
R31	68K			Note 1
R32	1meg			
R33	82K			
R34	27K			
R35	1000Ω			
R36	150K			
R37	68K			Note 1
R38	68K			
R39	100K 5%			
R40	100K 5%			
R41	39K			
R42	68K			Note 1
R43	82K			
R44	120Ω			Note 1
R45	470Ω			
R46	10K			
R47	6800Ω			
R48	100K			
R49	2.2meg			
R50	68K	1		

ITEM No.	RATING OHMS	RATING WATT	PILOT PART No.	NOTES
R51	100K			
R52	330K			
R53	27K 5%			
R54	220K 5%			
R55	68K 5%			
R56	82K 5%			
R57	8200Ω 5%			
R58	100K 5%			
R59	82K 5%			
R60	22K 5%			Note 1
R61	2.2meg			
R62	82K	1		
R63	10K	1		
R64	4.7meg			
R65	3300Ω	1		
R66	220K			
R67	220K			
R68	33K			
R69	1meg			
R70	22K			
R71	22K			
R72	100K			
R73	4.7meg			
R74	180K	1		
R75	3300Ω	1		
R76	220K 5%			
R77	220K			
R78	150K			
R79	4700Ω 5%			
R80	100K 5%			
R81	330K	1		
R82	3300Ω	1		
R83	220K	1		
R84	82K			
R85	470Ω			
R86	10K			
R87	5600Ω			
R88	400Ω	10	31-162	
R89	270Ω			
R90	270Ω			
R91	270Ω			
R92	470K			
R93	220K			
R94	68K	1		

Note 1. Not used in some versions.

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA PILOT PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No.	NOTES
L1	FM Ant. Coil	70-81					
L2	Cathode Choke	75-33	19-1004	SW-631	4529		5 Microhenries
L3	RF Choke	75-33	19-1004	SW-631	4529		5 Microhenries
L4	FM RF Coil	71-42					
L5	Fil. Choke	75-19	19-1001	BC-562	4604		1.5 Microhenries
L6	Fil. Choke	75-19	19-1001	BC-562	4604		1.5 Microhenries
L7	RF Choke	75-33	19-1004	SW-631	4529		5 Microhenries
L8	FM Osc. Coil	72-77					
L9	Loop Stick	270-54					
L10	AM IF Trap	79-102					
L11	AM RF Coil	71-43					
L12	AM Osc. Coil	72-78					
L13	RF Choke	75-33	19-1004	SW-631	4529		5 Microhenries
L14	Fil. Choke	75-19	19-1001	BC-562	4604		1.5 Microhenries
L15	RF Choke	75-19	19-1001	BC-562	4604		1.5 Microhenries

COILS (cont)

ITEM No.	USE	REPLACEMENT DATA PILOT PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No.	NOTES
L16	1st FM IF Trans.	273-151	16-3487	FM-254	1463		
L17	1st AM IF Trans.	273-129	16-6758	BC-352	12-C1	RF-1	
L18	2nd FM IF Trans.	273-151	16-3487	FM-254	1463		
L19	2nd AM IF Trans.	273-129	16-6758	BC-353	12-C2	RF-2	
L20	3rd FM IF Trans.	273-151	16-3487	FM-254	1463		
L21	Discriminator Trans.	279-77	17-3494	FM-253	1464		
L22	10KC Filter	79-106					
L23	Line Choke	75-19	19-1001	BC-562	4604		1.5 Microhenries
L24	Line Choke	75-19	19-1001	BC-562	4604		1.5 Microhenries

TRANSFORMER (POWER)

ITEM No.	RATING PRI.	RATING SEC. 1	RATING SEC. 2	REPLACEMENT DATA PILOT PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117V @ .64A	400VCT @ .100A	30VCT @ .30A	55-53						
	SEC. 3	SEC. 4	SEC. 5							
	6.3V @ 2.6A	5V @ 2A								

SELENIUM RECTIFIER

ITEM No.	RATING CURRENT (Measured)	REPLACEMENT DATA PILOT PART No.	FEDERAL PART No.	INTERNATIONAL PART No.	SARKES TARZIAN PART No.	NOTES
M1	.29A	110-519		61-2151	3N33-1C1-RV	

MISCELLANEOUS

ITEM No.	PART NAME	PILOT PART No.	NOTES
M2	Lamp	68-10	#1847
M3	Lamp	68-10	#1847
M4	Tuning Cap.	26-60	6 Gang (AM Sections: Ant. 23-488mmf, RF 21-485mmf, Osc. 24-172mmf)
M5	Switch	100-112	Equalizer, Rotary, Wafer Type
M6	Switch	101-41	Rumble Filter, SPST, Slide Type
M7	Switch	100-111	Selector, Rotary, Wafer and Slide Type
M8	Switch	100-43	AM-FM, AFC Selector, Slide type, mechanically coupled with M7

CABINETS & CABINET PARTS

(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

WIRING DATA

General-use Unshielded Hook-up Wire ..... Use BELDEN No. 8530 (Solid) Available in Ten Colors
8524 (Stranded) Available in Ten Colors

Power Cord ..... Use BELDEN No. 1765-B (6 Ft. Length)
1725-K (7½ Ft. Length)

PHOTOFACT* Folder

EIA MEMBER ELECTRONIC INDUSTRIES ASSOCIATION

SILVERTONE MODELS 8055, A, 8056, A (Ch. 528.53010)

SILVERTONE MODELS 8055, A, 8056, A (Ch. 528.53010)

MODEL 8055A

SILVERTONE MODELS 8055, A, 8056, A (Ch. 528.53010)

TRADE NAME	Silvertone Models 8055, 8055A, 8056, 8056A (CH. 528.53010)
SUPPLIER	Sears Roebuck & Co., 925 S. Homan Ave., Chicago, Illinois
TYPE SET	AC Operated FM-AM Receiver With 4 Speed Automatic Record Changer
TUBES (Nine)	Types 6CB6 FM-AM RF Amplifier, 6U8 FM-AM Mixer - FM-AM Osc., 6BA6 1st FM-AM IF Amp., 6BA6 2nd FM IF Amp. - AM Det. -AVC, 6AL5 Ratio Detector, 6AU6 AF Amplifier, (2) 6V6GT Output, 5Y3GT Rectifier.
POWER SUPPLY	110-120 Volts AC-60 Cycles RATING .80 Amp. @117 Volts AC (77 Watts) FM
TUNING RANGE - BROADCAST	535 - 1620KC FREQ. MOD. 88 - 108MC

FOR SERVICE INFORMATION ON RECORD CHANGER - SEE SILVERTONE 528.56125 - PHOTOFACT SET 417 FOLDER 10

SET 425 FOLDER 14

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

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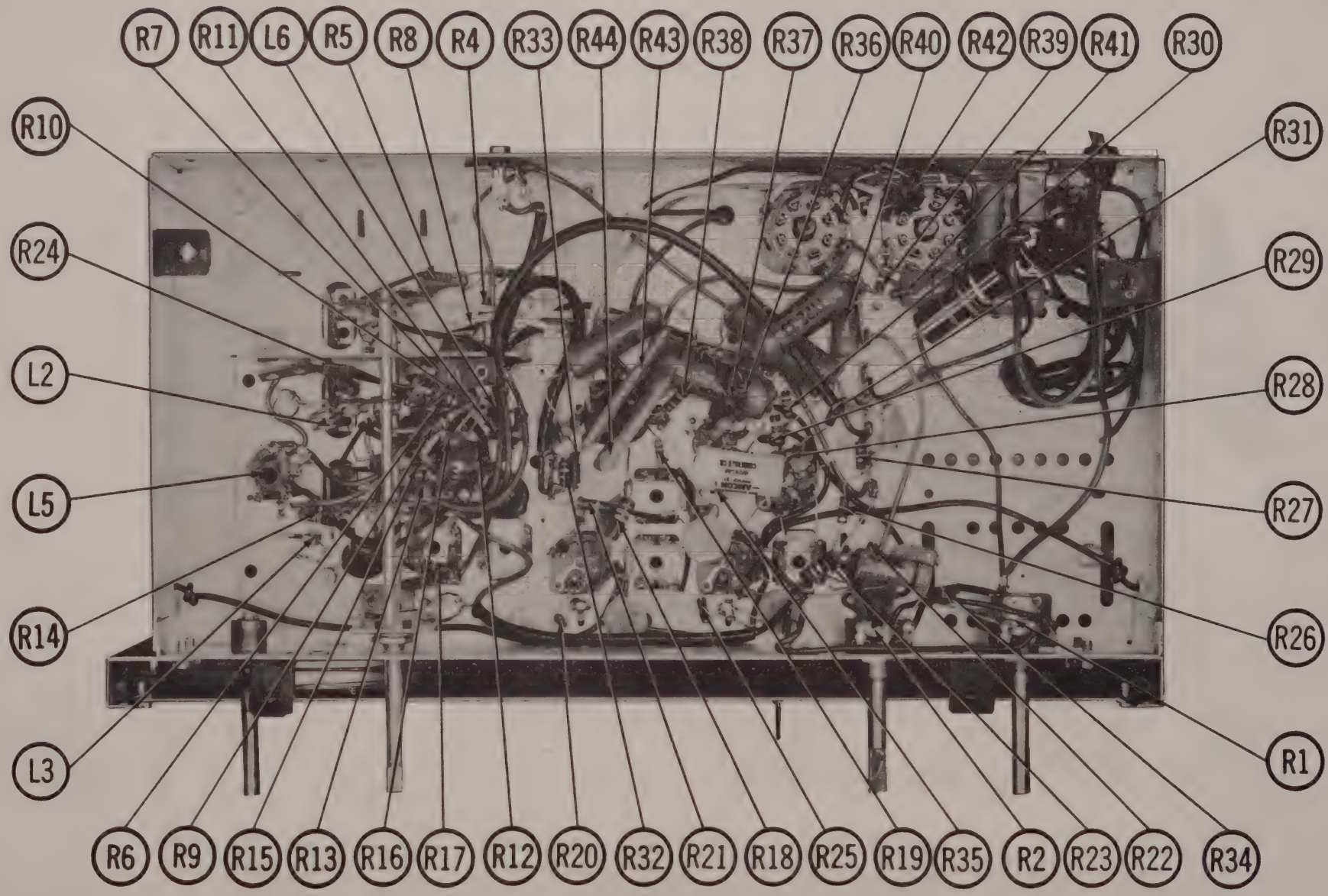
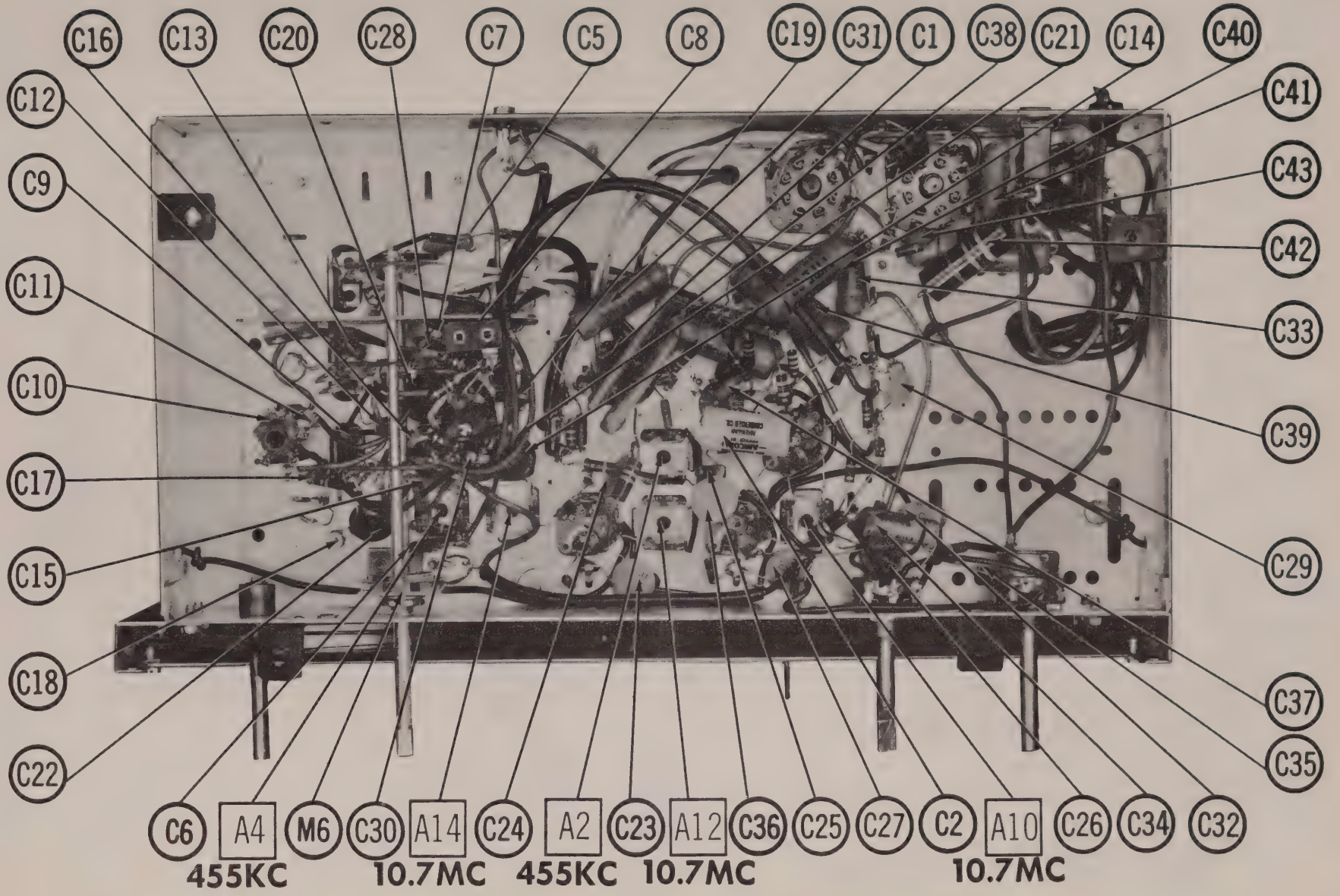
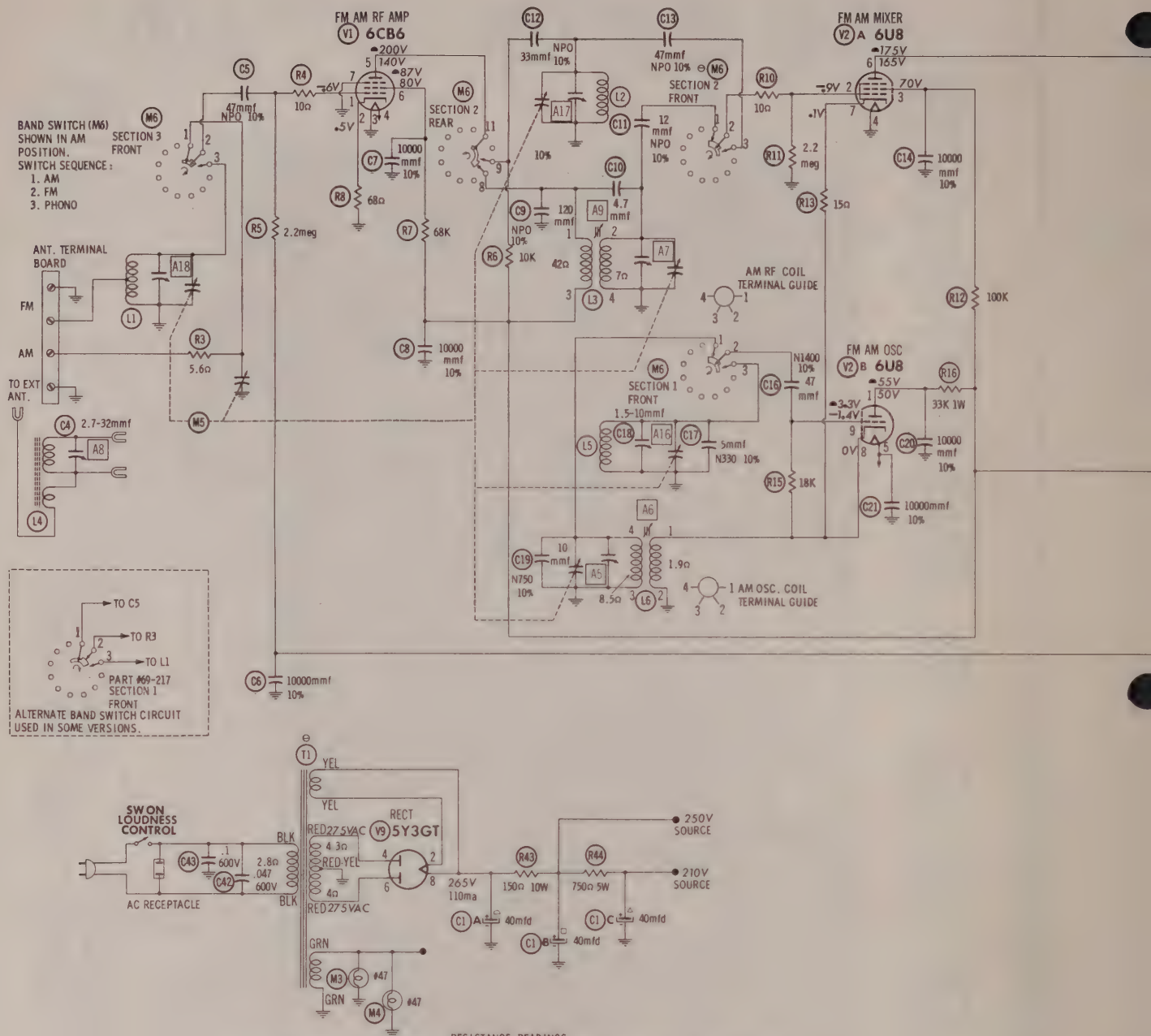
H680



CHASSIS BOTTOM VIEW-RESISTOR AND INDUCTOR IDENTIFICATION



CHASSIS BOTTOM VIEW-CAPACITOR AND ALIGNMENT IDENTIFICATION



RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	6CB6	2.2meg - 4.7meg	68Ω	0Ω	.1Ω	† 11K † 1400Ω	† 69K	0Ω		
V2	6U8	† 34K	2.2meg	† 100K	0Ω	.1Ω	†11K	17Ω	1.9Ω	18K
V3	6BA6	320K - 2.7meg	0Ω	0Ω	.1Ω	† 1900Ω	† 28K	68Ω		
V4	6BA6	490K	0Ω	0Ω	.1Ω	† 3200Ω	† 28K	68Ω		
V5	6AL5	0Ω	15K	1.9Ω	.1Ω	INF	0Ω	INF		
V6	6AU6	10meg	0Ω	0Ω	.1Ω	† 320K	† 1.2meg	0Ω		
V7	6V6GT	0Ω	.1Ω	† 360Ω	† 900Ω	470K	NC	0Ω	150Ω	
V8	6V6GT	0Ω	.1Ω	† 360Ω	† 900Ω	470K	NC	0Ω	150Ω	
V9	5Y3GT	NC	¶	NC	4.3Ω	NC	4Ω	NC	¶	

¶ THIS READING WILL VARY DEPENDING UPON THE CONDITION OF THE ELECTROLYTIC CAPACITOR CONNECTED IN THE ASSOCIATED CIRCUIT.
† MEASURED FROM PIN 8 OF V9
- MEASURED IN "AM" POSITION
NC NO CONNECTION

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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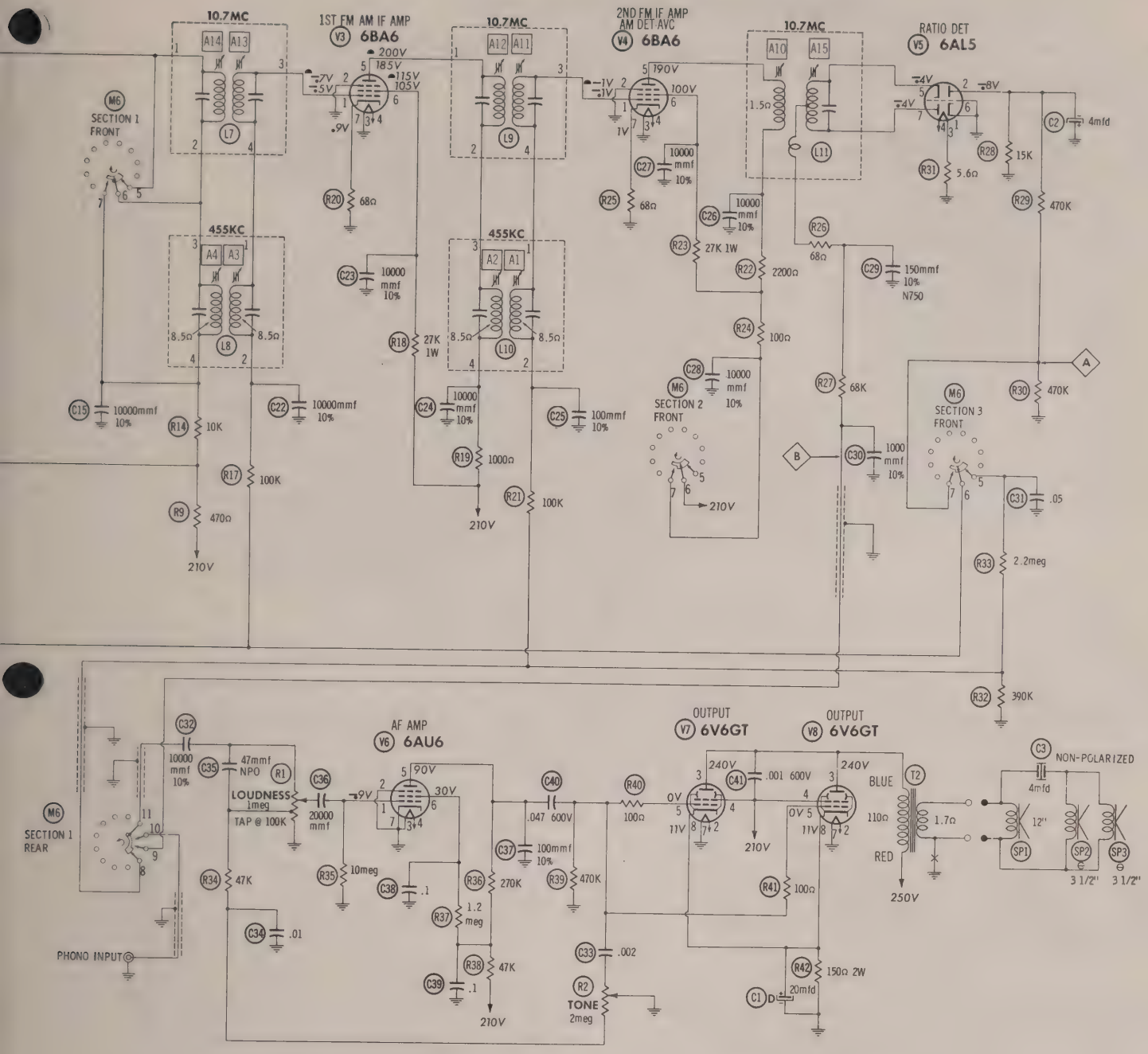


1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

Θ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

425-14

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

AM ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.1mfd	High side to AM RF stator lug of tuning gang. Low side to chassis	455KC (400 ∿ Mod.)	AM	Tuning gang fully open	Across voice coil	A1, A2, A3, A4	Adjust for maximum output
2.	"	"	1620KC	"	1620KC	"	A5	"
3.	"	"	600KC	"	600KC	"	A6	Adjust for maximum output while rocking tuning gang. Repeat Steps 2 & 3.
4.		Loop	1400KC	"	Tune for 1400KC signal	"	A7, A8,	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
5.		"	600KC	"	Tune for 600KC signal	"	A9	"

FM IF ALIGNMENT USING AM SIGNAL GENERATOR & VTVM

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
6.	.005mfd	High side to FM RF stator lug of tuning gang. Low side to chassis	10.7MC (Unmod.)	FM	Point of non-interference	DC probe to point Ⓐ. Common to chassis	A10, A11, A12, A13, A14	Adjust for maximum deflection
7.	"	"	"	"	"	DC probe to point Ⓑ. Common to point Ⓐ.	A15	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.

FM IF ALIGNMENT USING FM SIGNAL GENERATOR & OSCILLOSCOPE

Use frequency modulated signal with 60∿ modulation and 450KC sweep. Use 120∿ sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT SCOPE	ADJUST	REMARKS
6.	.005mfd	High side to FM RF stator lug of tuning gang. Low side to chassis.	10.7MC (450KC Swp)	FM	Point of non-interference	Vert. Amp. to point Ⓐ. Low side to chassis	A10, A11, A12, A13, A14	Disconnect stabilizing capacitor C2. Adjust for curve of maximum amplitude and symmetry similar to Fig. 1.
7.	"	"	"	"	"	Vert. Amp. to point Ⓑ. Low side to chassis	A15	Reconnect stabilizing capacitor C2. Adjust so that 10.7MC occurs at center of crossover lines similar to Fig. 2. SLIGHTLY retouch A10 for maximum amplitude and straightness of cross-over lines.

FM RF ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
8.	270Ω Carbon Resistor	High side to FM antenna terminal. Low side to chassis	108MC (Unmod.)	FM	108MC	DC probe to point Ⓐ. Common to chassis	A16	Adjust for maximum deflection
9.	"	"	104MC	"	Tune for 104MC signal	"	A17, A18	"
	If receiver fails to track properly, proceed with step 10.							
10.	"	"	90MC	"	90MC	"	L3	Adjust for maximum deflection by compressing or expanding coil turns. Repeat Steps 8, 9, & 10.

FIG. 1

FIG. 2

PARTS LIST AND DESCRIPTIONS

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE	NOTES
V1	FM-AM RF Amp	6CB6	
V2	FM-AM Mixer-FM-AM Osc.	6U8	
V3	1st FM-AM IF Amp	6BA6	
V4	2nd FM IF Amp-AM Det. - AVC	6BA6	

ITEM No.	USE	TYPE	NOTES
V5	Ratio Detector	6AL5	
V6	AF Amplifier	6AU6	
V7	Output	6V6GT	
V8	Output	6V6GT	
V9	Rectifier	5Y3GT	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING CAP.	RATING VOLT.	REPLACEMENT DATA SILVERTONE PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1A	▪ 40	350	18-34-3	AFH4-53	D0460	FP430.6	TMQ-58	Q-215	TVL-4622.3
B	▪▪ 40	350							
C	▲ 40	350							
D	20	25							
C2	4	50	18-25-0	PRS150V4	BBR4-50	TC30	TD-4-50	MT-0504	TVA-1402
C3	4	150NP	18-9-5	NP-PRS150V4	BBR8-150 †	TC41 †	TD-8-150 †	MT-1508 †	R1251 *
					BBR8-150	TC41	TD-8-150	MT-1508	

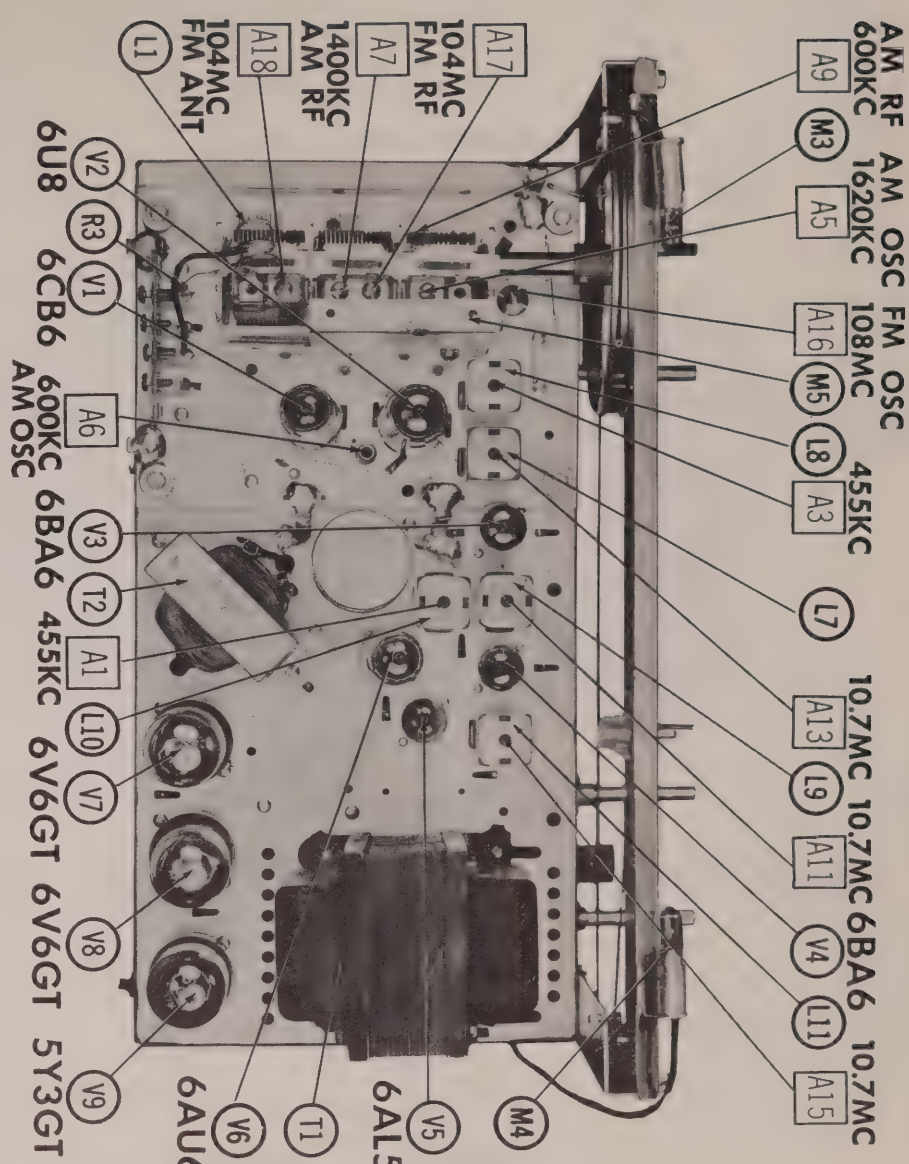
† Connect negative leads together.
* Not normally in distributors stock. Available thru distributor on order to manufacturer.

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING CAP.	RATING VOLT	REPLACEMENT DATA SILVERTONE PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C4	2.7-32		19-180-0						
C5	47		15-470611	NPO-SI47	TCZ-47	CTA6Q47C		5TCC-Q47	10% NPO
C6	10000		15-10317						10%
C7	10000		15-10317						10%
C8	10000		15-10317						10%
C9	120		15-12161	NPO-SI120	TCZ-120	CTA6T12C		5TCC-T12	10% NPO
C10	4.7		20-23-0	NPO-SI4.7	TCZ-4R7	CTA6V47C	ZT-5547	5TCCB-V47	10%
C11	12		15-120611		TCZ-12	CTA6Q12C			10% NPO
C12	33		15-330611	NPO-SI33	TCZ-33	CTA6Q33C	ZT-5433	5TCC-Q33	10% NPO
C13	47		15-470611	NPO-SI47	TCZ-47	CTA6Q47C	ZT-5447	5TCC-Q47	10% NPO
C14	10000		15-10317						10%
C15	10000		15-10317						10%
C16	47		15-470115						10% NI400
C17	5		15-509612						10% N330
C18	1.5-10		19-2-5		829-10				
C19	10		15-100614	N750-SI10	DTN-10	CTA6Q1U	NT-541	5TCU-Q1	10% N750
C20	10000		15-10317						10%
C21	10000		15-10317						10%
C22	10000		15-10317						10%
C23	10000		15-10317						10%
C24	10000		15-10317						10%
C25	100		15-10161	NPO-SI100	TCZ-100	CTA6T1C	ZT-531	5TCC-T1	10%
C26	10000		15-10317						10%
C27	10000		15-10317						10%
C28	10000		15-10317						10%
C29	150		15-15111	N750-SI150	TCZ-150	CTA6T15U		5TCU-T15	10% N750
C30	1000		15-10261		1R5D1		MCB255	MS-21	10%
C31	.05	200	16-50323	P288N-05	DF-503	CUB2S5	GEM-415	2TM-S5	
C32	10000		15-10317						10%
C33	.002	400	16-20243	P488N-002	D6-202	CUB6D2	GEM-622	6TM-D2	
C34	.01	400	16-10343	P488N-01	D6-103	CUB4S1	GEM-411	4TM-S1	
C35	47		15-47011	NPO-DI47	DTZ-47	C10Q47C		5TCC-Q47	NPO
C36	20000		15-20317	BPD-02	DD-203	BYB6S2		5HK-S2	
C37	100		15-10161	NPO-SI100	TCZ-100	LT6T1	ZT-531	5TCC-T1	10%
C38	.1	400	16-10443	P488N-1	DF-104	CUB4P1	GEM-411	4TM-P1	
C39	.1	400	16-10443	P488N-1	DF-104	CUB4P1	GEM-411	4TM-P1	
C40	.047	600	16-50343	P688N-047	DF-503	CUB6S47	GEM-6147	6TM-S47	
C41	.001	600	16-10253	P688N-001	D6-102	CUB6D1	GEM-621	6TM-D1	
C42	.047	600	20-647-1	P688N-047	DF-503	CUB6S47	GEM-6147	6TM-S47	
C43	.1	600	20-611-1	P688N-1	DF-104	CUB6P1	GEM-611	6TM-P1	

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	SILVERTONE PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1A	1meg	½	24-239-0	BT-7417	A47FS-1meg	Q18-137X	UT-440	Loudness Tap@100K
B	Shaft			Not Req.	FS-3	Not Req.	Not Req.	
C	Switch			KB-1 or KR-1*	SWE-12	76-1	US-26	Power On-Off
R2A	2meg	½	24-240-0	B-75	A47-2meg-S	Q11-139	U56	Tone
B	Shaft			Not Req.	FS-3	Not Req.	Not Req.	

*' Use KR with CRL "Red Label" controls and "KB with "Blue Label" controls.

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING OHMS	RATING WATT	SILVERTONE PART No.	NOTES
R3	5.6Ω		60-56901	
R4	10Ω		60-10001	
R5	2.2meg		60-22502	
R6	10K		60-10301	
R7	68K		60-68301	
R8	68Ω		60-68001	
R9	470Ω		60-47101	
R10	10Ω		60-10001	
R11	2.2meg		60-22502	
R12	100K		60-10401	
R13	15Ω		60-15001	
R14	10K		60-10301	
R15	18K		60-18301	
R16	33K		60-33311	
R17	100K		60-10402	
R18	27K		60-27311	
R19	1000Ω		60-10202	
R20	68Ω		60-68001	
R21	100K		60-10402	
R22	2200Ω		60-22201	
R23	27K		60-27311	

ITEM No.	RATING OHMS	RATING WATT	SILVERTONE PART No.	NOTES
R24	100Ω		60-10102	
R25	68Ω		60-68001	
R26	68Ω		60-68001	
R27	68K		60-68301	
R28	15K		60-15301	
R29	470K		60-47401	
R30	470K		60-47401	
R31	5.6Ω		60-56901	
R32	390K		60-39401	
R33	2.2meg		60-22502	
R34	47K		60-47301	
R35	10meg		60-10602	
R36	270K		60-27401	
R37	1.2meg		60-12501	
R38	47K		60-47301	
R39	470K		60-47402	
R40	100Ω		60-10101	
R41	100Ω		60-10101	
R42	150Ω	2	60-15121	
R43	150Ω	10(WW)	61-122-0	
R44	750Ω	5(WW)	61-15	

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA SILVERTONE PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No.	NOTES
L1	FM Ant. Coil	10-3-1					
L2	FM RF Coil	10-24-1					
L3	FM Osc. Coil	10-3-3					
L4	Loop Stick	82-106-0					
L5	AM RF Trans	10-1-1	14-1076 *		A-5495-RF		* Use full secondary
L6	AM Osc. Coil	10-2-4	14-1077	BC-393	71-OSC		
L7	1st FM IF	10-44-2	16-3487	FM-254	1463		
L8	1st AM IF	10-46-2	16-6758	BC-352	12-C1	RF-1	
L9	2nd FM IF	10-44-2	16-3487	FM-254	1463		
L10	2nd AM IF	10-46-2	16-6758	BC-353	12-C2	RF-2	
L11	Ratio Det.	10-15-0	17-3498	FM-255	1465		

TRANSFORMER (POWER)

ITEM No.	RATING PRI.	RATING SEC. 1	RATING SEC. 2	REPLACEMENT DATA SILVERTONE PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117V @.8A	540VCT @.110A	5V @1.8A	80-12-0	P9208	P-2882		PC8405		R-12A
	SEC. 3	SEC. 4	SEC. 5							
	6.3V @3A									
	PRI.	SEC. 1	SEC. 2							
	117V @.75A	520VCT @.110A	5V @1.8A	80-3-6 ①	P9208	P-2882		PC8405		R-12A
	SEC. 3	SEC. 4	SEC. 5							
	6.3V @3A									

① Alternate used in some versions.

SPEAKER

ITEM No.	TYPE SIZE	TYPE FIELD	TYPE V. C. IMP.	REPLACEMENT DATA SILVERTONE PART No.	REPLACEMENT DATA QUAM PART No.	NOTES
SP1	12"	PM	6-8Ω	33-313-4	12A6PA	
SP2	3½	PM	9-10Ω	33-323-4 ①	3A15TZ9-7	
SP3	3½	PM	9-10Ω	33-323-4 ①	3A15TZ9.7	① If speakers are connected in series, use Part #33-284-4

PHONO CARTRIDGE

ITEM No.	REPLACEMENT DATA SILVERTONE PART No.	ASTATIC PART No. CARTRIDGE	ASTATIC PART No. NEEDLE	JENSEN PART No. CARTRIDGE	JENSEN PART No. NEEDLE	REMARKS
M1	33-235-0 ①	53-T	GD-J			① Includes needles

ASTATIC NEEDLE LISTING SHOWN ABOVE IS SPECIFIED FOR THE RESPECTIVE REPLACEMENT CARTRIDGE LISTED: FOR ORIGINAL CARTRIDGE NEEDLE REPLACEMENTS SEE BELOW.

PHONO NEEDLE

(FOR REPLACEMENT IN ORIGINAL EQUIPMENT CARTRIDGE)

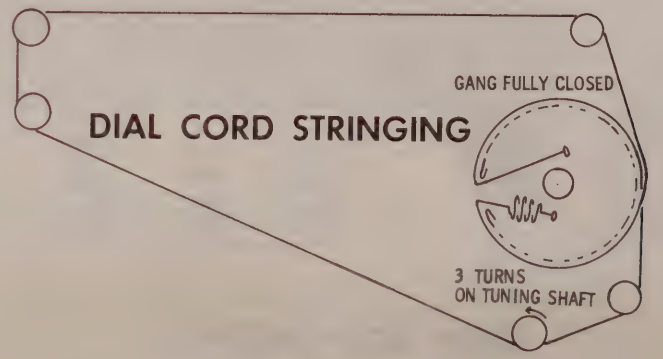
ITEM No.	REPLACEMENT DATA SILVERTONE PART No.	JENSEN PART No.	WALCO PART No.	REMARKS
M2	83-1172	† S-66 or †♦ S-66SD or ♦ S-66D	† W-75TPS or †♦ W-75DS or ♦ W-75TPD	† Jewel ♦ Diamond

MISCELLANEOUS

ITEM No.	PART NAME	SILVERTONE PART No.	NOTES
M3	Lamp	89-7	#47
M4	Lamp	89-7	#47
M5	Tuning Cap.	19-20-3	6 Gang (AM Sections: ANT. 15-485mmf, RF 25-380mmf, Osc. 15-152mmf)
M6	Switch	69-205-0	Band Switch 3 Wafer 8 Pole 3 Position Rotary
	Switch	69-217	Bandswitch (Alternate)

WIRING DATA

General-use Unshielded Hook-up Wire	Use BELDEN No. 8530 (Solid) Available in Ten Colors 8524 (Stranded) Available in Ten Colors
Power Cord	Use BELDEN No. 1765-B (6 Ft. Length) 1725-K (7½ Ft. Length)
Low-Loss Shielded Lead (Interconnecting)	Use BELDEN No. 8401
Phono Pick-up Arm Cable	Use BELDEN No. 8430 (Two Conductor - Twisted)



PHOTOFACT* Folder

with CIRCUITRACE*

TRAV-LER MODELS TR-280, TR-281, TR-282, TR-283

TRAV-LER MODELS TR-280,
TR-281, TR-282, TR-283

MODEL TR-280

TRADE NAME	Trav-Ler Models TR-280, TR-281, TR-282, TR-283
MANUFACTURER	Trav-Ler Radio & Tel. Corp. 571 W. Jackson Blvd., Chicago, Illinois
TYPE SET	Battery Operated Portable AM Transistorized Receiver
POWER SUPPLY	9 Volts DC
TUNING RANGE—BROADCAST	535-1620KC
RATING	22MA @ 9 Volts DC (No Signal, Min Volume) 25MA @ 9 Volts DC (Signal, Normal Volume)

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.		Loop	455KC (400% Mod.)	Tuning gang	Across Voice Coil	A1, A2, A3	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
2.		"	1620KC	"	"	A4	"
3.		"	600KC	600KC	"	A5	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output while rocking tuning gang. Repeat Steps 2 & 3.
4.		"	1400KC	Tune to 1400KC Signal	"	A6	"

TRAV-LER MODELS TR-280,
TR-281, TR-282, TR-283

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

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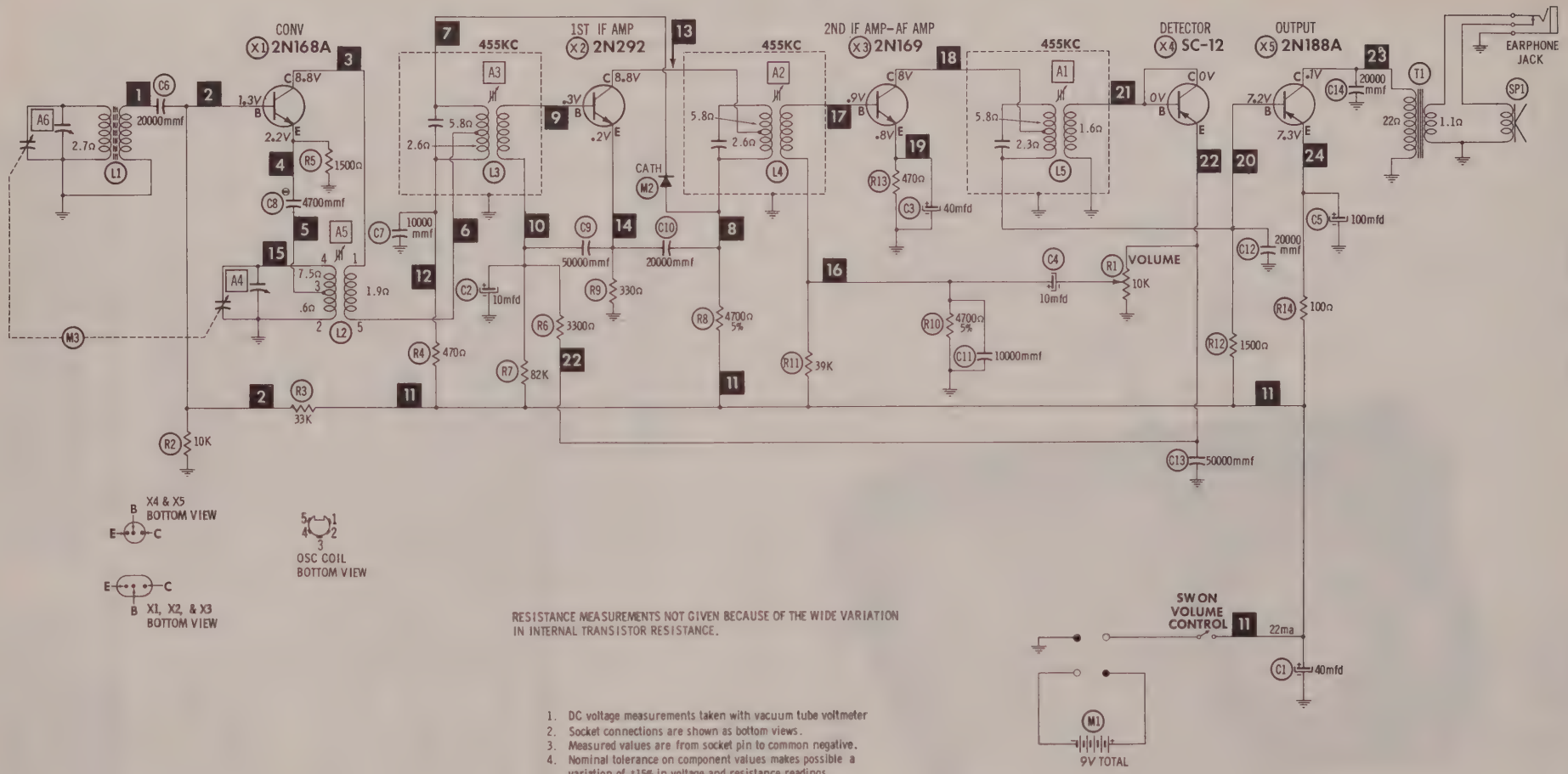

RESISTANCE MEASUREMENTS NOT GIVEN BECAUSE OF THE WIDE VARIATION IN INTERNAL TRANSISTOR RESISTANCE.

1. DC voltage measurements taken with vacuum tube voltmeter
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.
5. Volume control at maximum. no signal apllied for voltage measurements.

Θ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

A PHOTOFACT STANDARD NOTATION SCHEMATIC with CIRCUITRACE* *TRADE MARK

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425-15

PARTS LIST AND DESCRIPTIONS

TRANSISTORS

ITEM No.	ORIG. TYPE	USE	REPLACEMENT DATA				NOTES
			CBS PART No.	RCA PART No.	RAYTHEON PART No.	SYLVANIA PART No.	
X1	2N168A	Converter	CBS-2N439			2N212	NPN
X2	2N292	1st IF Amplifier	CBS-2N439			2N94	NPN
X3	2N169	2nd IF Amp. -AF Amp.	CBS-2N439			2N94	NPN
X4	SC-12	Detector		2N406	CK879	2N34	PNP
X5	2N188A	Output	CBS-2N181	2N270	2N632	2N241A	PNP

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT.	TRAV-LER PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1	40	12	EC-84	XPP-12040	NL50-10	TT15X40	ML40-15	MQ-0130	R2329 *
C2	10	12	EC-83	XPP-12010	NL10-15	TT12X10	ML10-15		TE-1128
C3	40	12	EC-84	XPP-12040	NL50-10	TT15X40	ML40-15	MQ-0130	R2329 *
C4	10	12	EC-83	XPP-12010	NL10-15	TT12X10	ML10-15		TE-1128
C5	100	12	EC-82	SRE12V100	NL100-10	TT15X100	ML100-15		TE-1162

* Not normally in distributors stock. Available thru distributor on order to manufacturer.

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP.	VOLT	TRAV-LER PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	SPRAGUE PART No.	
C6	20000		CC-65	BPD-02	DD-203	BYB6S2		5HK-S2	
C7	10000		CC-64	BPD-01	DD-103	BYA10S1	DC511	5HK-S1	
C8	4700			BPD-0047	DD-472	BYA10D47M	UC-5247	5HK-D47	①
C9	50000		CC-66	BPD-05	DF-503			5HK-S5	
C10	20000		CC-65	BPD-02	DD-203	BYB6S2		5HK-S2	
C11	10000		CC-64	BPD-01	DD-103	BYA10S1	DC511	5HK-S1	
C12	20000		CC-65	BPD-02	DD-203	BYB6S2		5HK-S2	
C13	50000		CC-66	BPD-05	DF-503			5HK-S5	
C14	20000		CC-65	BPD-02	DD-203	BYB6S2		5HK-S2	

① Some versions may use 20000mmf in this application (Part #CC-65).

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	TRAV-LER PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1	10K	1/4	VC-127					Volume & Switch

RESISTORS

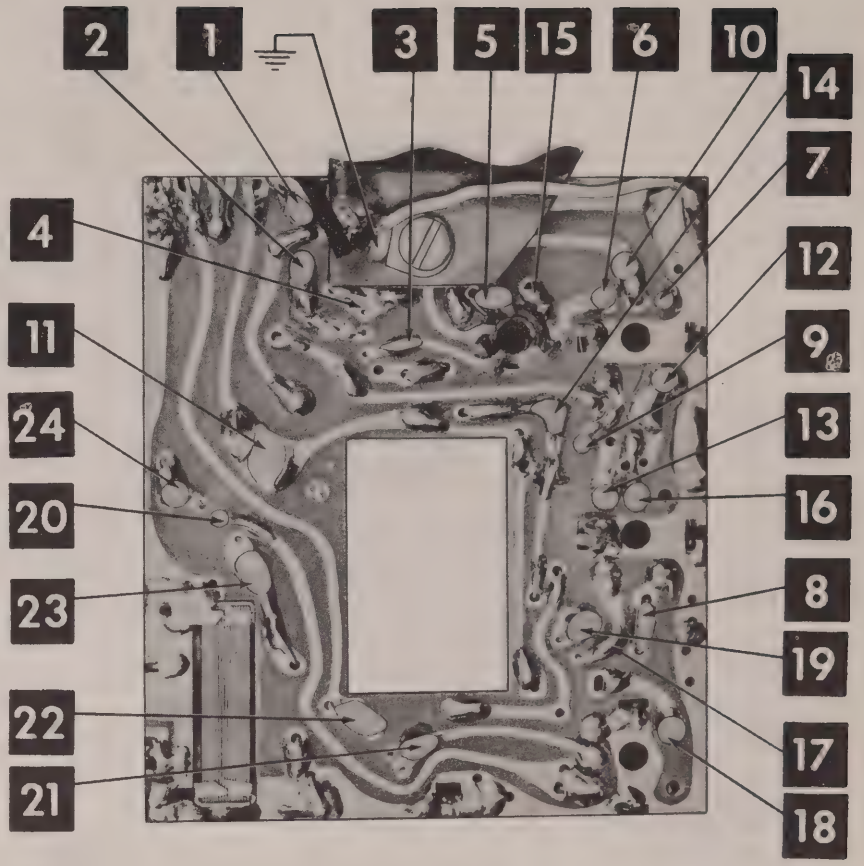
All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING		TRAV-LER PART No.	NOTES
	OHMS	WATT		
R2	10K		IR-64	
R3	33K		IR-158	
R4	470Ω		IR-199	
R5	1500Ω		IR-29	
R6	3300Ω		IR-108	
R7	82K		IR-31	
R8	4700Ω 5%		IR-156	

ITEM No.	RATING		TRAV-LER PART No.	NOTES
	OHMS	WATT		
R9	330Ω		IR-189	
R10	4700Ω 5%		IR-156	
R11	39K		IR-121	
R12	1500Ω		IR-29	
R13	470Ω		IR-199	
R14	100Ω		IR-104	

PRINTED BOARD

A Howard W. Sams CIRCUITRACE* Photo
*TRADE MARK



PARTS LIST AND DESCRIPTIONS (Continued)

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA					
		TRAV-LER PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No.	NOTES
L1	Loop Stick	LL-46	14-9001				
L2	Osc. Coil	LO-25-A					
L3	1st IF	LI-20					
L4	2nd IF	LI-20					
L5	3rd IF	LI-21					

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA							NOTES
	PRI.	SEC.	TRAV-LER PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T1	600Ω	22Ω	AT-33	GH5 ①			TA-42 ①		TY-45X①	① Use original channel frame

SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	TRAV-LER PART No.	QUAM PART No.	
SP1	2½"	PM	22Ω	SPK-52		

BATTERIES

ITEM No.	VOLTAGE	TRAV-LER PART No.	REPLACEMENT DATA						NOTES
			BURGESS		EVEREADY		MALLORY		
			"A"	"B"	"A"	"B"	"A"	"B"	
M1	9V			P6		226		M1600	

CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA			NOTES
		TRAV-LER PART No.	CBS PART No.	SYLVANIA PART No.	
M2	CTP-461	SC-7	1N64	1N295	Overload diode (Pigtail)

MISCELLANEOUS

ITEM No.	PART NAME	TRAV-LER PART No.	NOTES
M3	Tuning Cap Printed Board	GC-22 720M	Two gang (Ant. 10-132mmf, Osc. 18-97mmf)

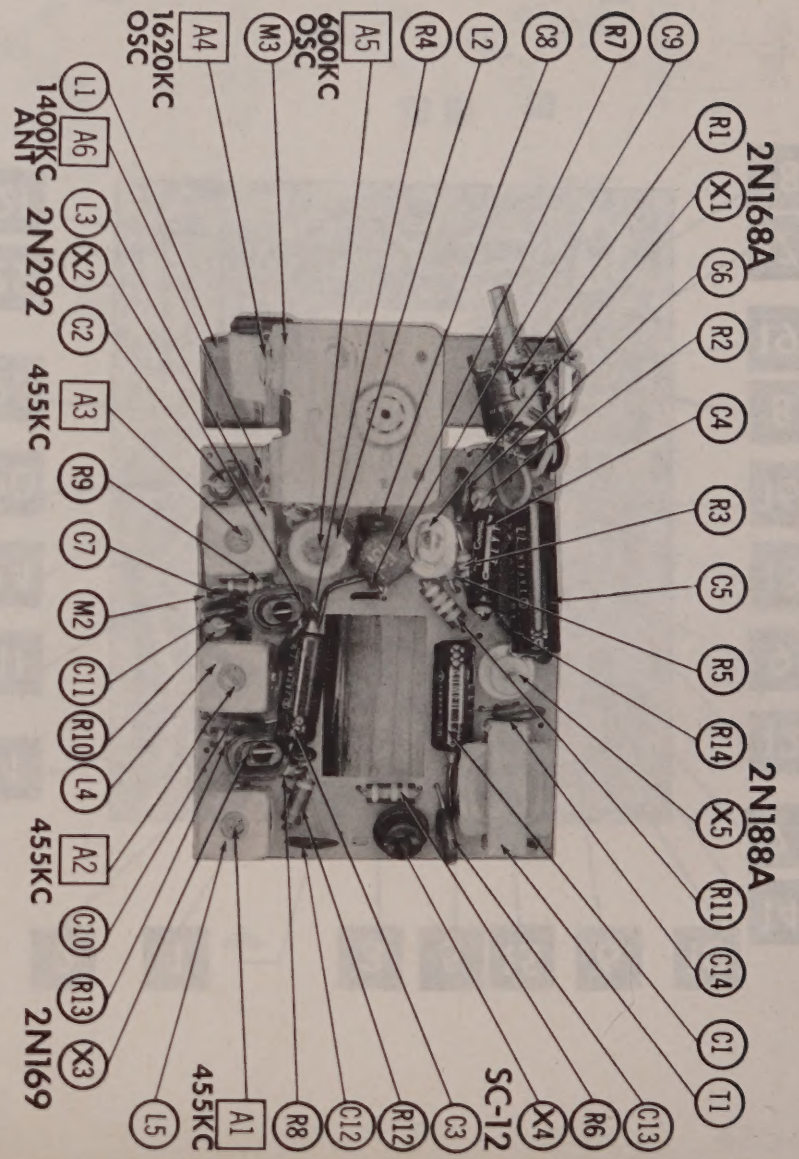
CABINETS & CABINET PARTS

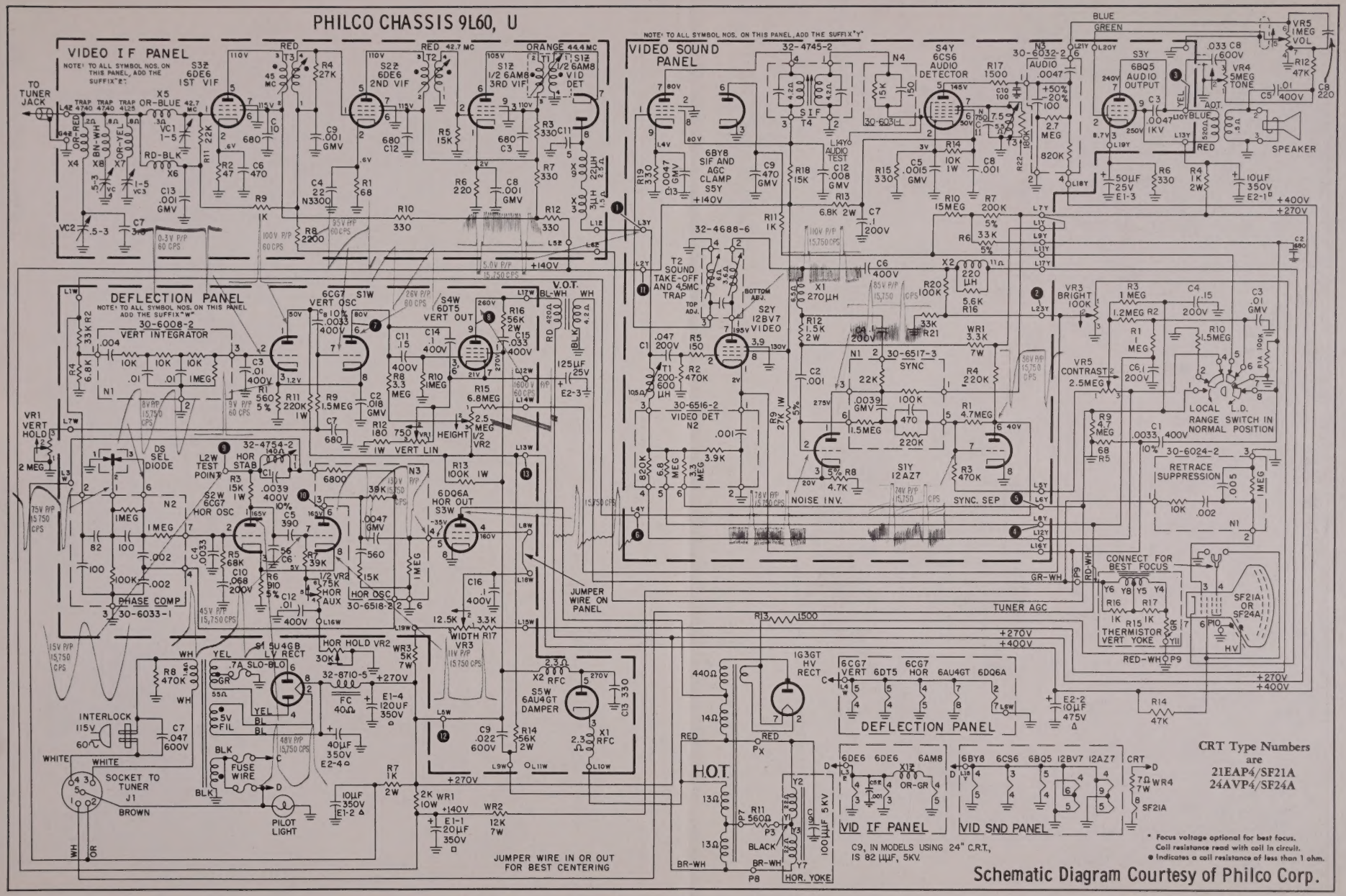
(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

WIRING DATA

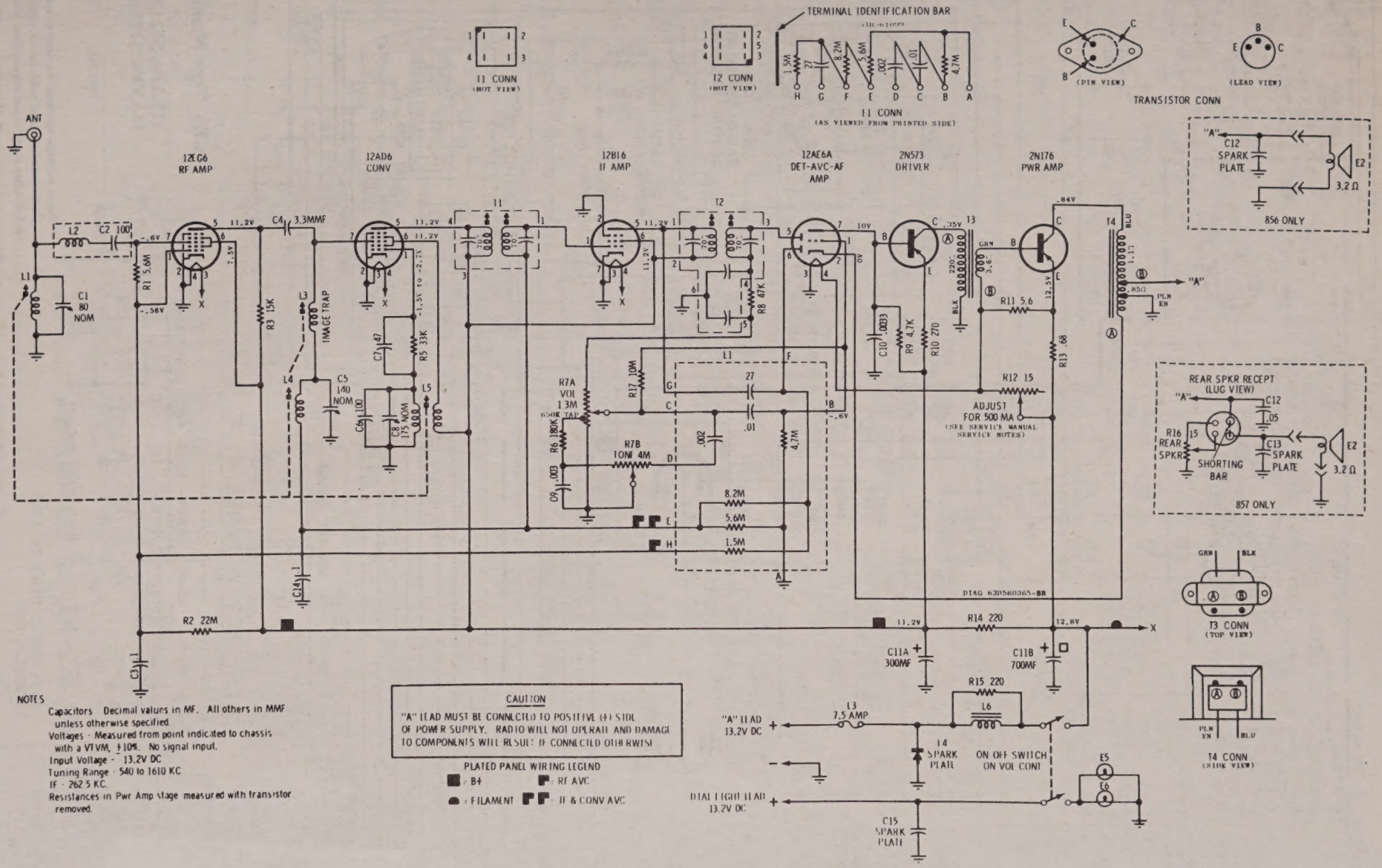
General-use Unshielded Hook-up Wire ..... Use BELDEN No. 8530 (Solid) Available in Ten Colors
8524 (Stranded) Available in Ten Colors

CHASSIS—TOP VIEW




PHILCO CHASSIS 9L60, U
VIDEO IF PANEL
VIDEO SOUND PANEL
DEFLECTION PANEL
TO TUNER JACK
S3Z 6DE6 1ST VIF
S2Z 6DE6 2ND VIF
S1Z 1/2 6AM8 3RD VIF
S1Z 1/2 6AM8 VID DET
32-4745-2
S4Y 6CS6 AUDIO DETECTOR
30-6032-2
S3Y 6BQ5 AUDIO OUTPUT
VR5 1MEG VOL
VR4 5MEG TONE
SPEAKER
6BY8 SIF AND AGC CLAMP S5Y
32-4688-6
T2 SOUND TAKE-OFF AND 4.5MC TRAP
S2Y 12BV7 VIDEO
30-6517-3 SYNC
30-6516-2 VIDEO DET N2
S1Y 12AZ7
NOISE INV.
SYNC. SEP
30-6008-2 VERT INTEGRATOR
6CG7 S1W VERT OSC
S4W 6DT5 VERT OUT
V.O.T.
32-4754-2
S2W 6CG7 HOR OSC
6DQ6A HOR OUT S3W
30-6033-1 PHASE COMP
30-6518-2 HOR OSC
S1V 5U4GB LV RECT
S5W 6AU4GT DAMPER
1G3GT HV RECT
6CG7 VERT 6DT5 HOR 6AU4GT 6DQ6A
30-6024-2 RETRACE SUPPRESSION
LOCAL L.D. RANGE SWITCH IN NORMAL POSITION
CONNECT FOR BEST FOCUS
SF21A1 OR SF24A1
THERMISTOR VERT YOKE
HOR. YOKE
H.O.T.
VID IF PANEL
VID SND PANEL
SOCKET TO TUNER J1
INTERLOCK
PILOT LIGHT
FUSE WIRE
JUMPER WIRE ON PANEL
JUMPER WIRE IN OR OUT FOR BEST CENTERING
TUNER AGC
+270V
+400V
+140V
CRT Type Numbers are 21EAP4/SF21A 24AVP4/SF24A
C9, IN MODELS USING 24" C.R.T., IS 82 μμF, 5KV.
* Focus voltage optional for best focus. Coil resistance read with coil in circuit.
● Indicates a coil resistance of less than 1 ohm.
Schematic Diagram Courtesy of Philco Corp.

MOPAR MODELS 856, 857, 861



NOTES

Capacitors - Decimal values in MF. All others in MMF unless otherwise specified.
Voltages - Measured from point indicated to chassis with a VTVM, ±10%. No signal input.
Input Voltage - 13.2V DC
Tuning Range - 540 to 1610 KC
IF - 262.5 KC.
Resistances in Pwr Amp stage measured with transistor removed.

CAUTION

"A" LEAD MUST BE CONNECTED TO POSITIVE (+) SIDE OF POWER SUPPLY. RADIO WILL NOT OPERATE AND DAMAGE TO COMPONENTS WILL RESULT IF CONNECTED OTHERWISE

PLATED PANEL WIRING LEGEND

■ - B+ ■ - RF AVC
● - FILAMENT ■■ - IF & CONV AVC

Schematic Diagram Courtesy of Motorola, Inc.

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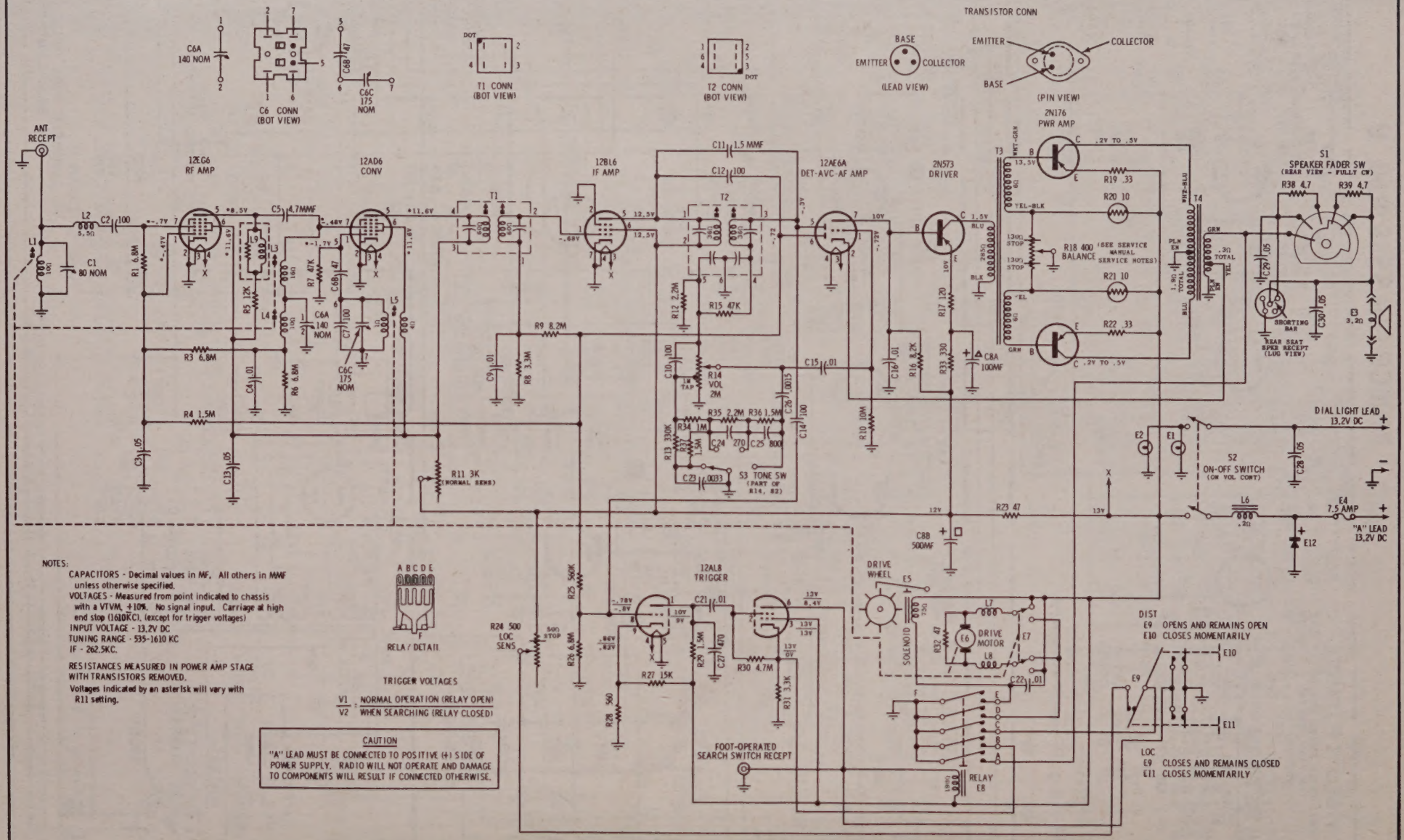
MOPAR MODEL 927



NOTES:

CAPACITORS - Decimal values in MF, All others in MMF unless otherwise specified.
VOLTAGES - Measured from point indicated to chassis with a VTVM, ±10%. No signal input. Carriage at high end stop (1610KC), (except for trigger voltages)
INPUT VOLTAGE - 13.2V DC
TUNING RANGE - 535-1610 KC
IF - 262.5KC.

RESISTANCES MEASURED IN POWER AMP STAGE WITH TRANSISTORS REMOVED.
Voltages indicated by an asterisk will vary with R11 setting.

TRIGGER VOLTAGES

V1	NORMAL OPERATION (RELAY OPEN)
V2	WHEN SEARCHING (RELAY CLOSED)

CAUTION

"A" LEAD MUST BE CONNECTED TO POSITIVE (+) SIDE OF POWER SUPPLY. RADIO WILL NOT OPERATE AND DAMAGE TO COMPONENTS WILL RESULT IF CONNECTED OTHERWISE.

Schematic Diagram Courtesy of Motorola, Inc.